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Field-Marshal Lord Grenfell of Kilvey.

President of the Royal Horticultural Society.

[*To face p.* 1.

JOURNAL

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F. J. CHITTENDEN, F.L.S.

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ROYAL BOTANIC GARDENS
Section
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JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

VOL. XXXIX. 1913.

PART I.

BOTANIZING IN BULGARIA.

By C. F. BALL.

[Read, February 4, 1913 : Mr. E. A. BOWLES, M.A., in the Chair.]

BULGARIA is separated from Roumania by the lower Danube. Its capital, Sofia, is a station on the International Railway and lies on a high granite plain which divides the valleys of the Morava and Maritza. The Rhodope Range dotted with monasteries forms the southern boundary.

The Balkan Mountains run eastward to the Black Sea, sinking abruptly to the fertile Maritza valley on the south and more gradually on the north side to the barren Danube plain.

The Bulgarians are a sturdy, independent nation, thrifty and hardworking, maybe rather taciturn, but honest, and striving after education. Only thirty years ago Sofia was a dirty Turkish village, and from that the Bulgarians are making a worthy capital ; already it has a population of about 100,000, and is like a miniature Brussels, with magnificent public buildings, electric trams running along broad well-paved streets, public gardens giving shade from the heat, and a large well-planted park. But so fast has Sofia grown that the roads on the outskirts of the town are anything but finished, and it is with the utmost *sangfroid* that the Bulgarian coachman drives over builders' waste materials, tree stumps, or other minor obstructions.

On Friday, June 16, 1911, Mr. COWLEY and I arrived in Sofia. My intention was to collect plants for the Royal Botanic Gardens, Glasnevin. We were met by The O'MAHONY of Kerry, who, in the time of the Macedonian murders, started an orphanage in Sofia and has educated there peasant orphans for the army, for doctors, and

for other professions. The O'MAHONY took us to see a friend, where we were first introduced to that quaint Eastern custom of offering the visitor a spoonful of jam and then a glass of water. *Cornus Mas*, the Cornelian Cherry, is a common shrub and the fruits are made into a pleasant preserve. *Prunus Pissardi* also fruits with the greatest freedom in Bulgaria and is used for the same purpose, but one of the strangest of all was the candied petals of the Madonna Lily in a sweet syrup.

It is well known how Bulgaria has prospered under King FERDINAND'S intelligent and wise rule. The twenty-six years of his reign have been a progress through difficulty to success. On Saturday it was with astonishment I learned that I was to be honoured at the palace by an interview with the King. His Majesty is a remarkably versatile monarch, and has many hobbies such as zoology and ornithology, besides being a keen gardener and botanist. After finding that I had not come to strip the country ruthlessly of rare plants, but only wanted a few of each, his Majesty gave every help and facility in the way of guides, ponies, and even a railway carriage, to our party for some of the excursions, and also kindly said he would like to show us the children of his garden, as he fondly termed his alpines in the palace garden.

The King has a very good collection of alpines; hardy orchids and ferns are very strong groups, while some mounds were planted entirely with *Haberlea rhodopensis* and *H. Ferdinandi-Coburgi*. Herr KELLERER is in charge of the alpines, and some years ago was sent on an expedition to Pirin to introduce *Pinus leucodermis*, and also obtained some alpines such as *Leontopodium alpinum Pirini*, a very distinct Edelweiss, *Astragalus physocalyx*, *Saxifraga Spruneri*, *Viola Clementiana*, &c. *Saxifraga* × *Kellereri* is a new hybrid raised in these gardens and a cross between *S. porophylla* and *S. Burseriana*. It flowers at Glasnevin in January with pink flowers about half the size of *S. Burseriana* and has handsome rosettes, 1¾ inch across, of lime-dotted, pointed leaves. *Geum* × *Borisii*, named after Prince Boris, is a natural hybrid of *G. bulgaricum* and *G. reptans*. Another hybrid Avens was found on Vitosh, and is supposed to be *G. montanum* × *G. coccineum*.

The Sofia plain lies at an altitude of 1600 feet above sea level, and the temperature ranges from 95° Fahr. in the summer to many degrees below zero in winter. Even in summer time severe hailstorms occur; experiencing a storm on the mountains one can imagine how bedding plants would fare, but bombs are fired on the approach of a storm, which then moves on to another place. The sun is so blazing hot in the summer that the best kinds of apples are enclosed in bags to prevent blistering by its heat. We also visited the palace gardens at Vrana, which have been well described by Monsieur A. DELMARD, the Director of all the King's gardens, in a former JOURNAL* of our Society. Here the King has a herd of white buffalos, while one is surprised by nightingales by the dozen singing in the daytime.

* Journal R.H.S. xxxvii, p. 536.

The common trees of Bulgaria are the Oak, Elm, Beech, Alder, Walnut, Birch, *Quercus conferta*, Spruce, Silver Fir, *Pinus montana*, and *P. Peuke*, while Limes, Robinias, and *Ailanthus glandulosa* are used in the large towns for avenues.

Our first excursion was to the Vitosh mountain, about 9000 feet high. Orchids were plentiful in the meadows, and the Fishbone Thistle, *Cnicus Casabonae*, was growing in stony places. *Salix Lapponum* with its silvery leaves shimmered over boggy places, and it was rather a surprise to me to find *Geum coccineum* most luxuriant in these bogs. In moist places the masses of *Saxifraga rotundifolia* were a picture. The Honey Balm (*Melittis Melissophyllum*) chose shady places in the woods where its large pink flowers were quite attractive; *Veronica austriaca* and *Genista sagittalis* were abundant. At intervals we passed the rare yellow European Columbine (*Aquilegia lutea*), but unfortunately up to the present it has not proved a lasting perennial in Ireland; *Lilium Jankae* is now very scarce on Vitosh. Towards the top of the mountain *Myosotis alpestris* covers some acres; *Pedicularis*, Gentians, and the beautiful little *Dianthus microlepis* (fig. 1) with pink and occasionally with white flowers were found. Other plants we saw were *Geranium macrorrhizum*, *G. phaeum*, *Geum montanum*, *Ranunculus aconitifolius* and *R. montanus*, *Asperula odorata*, *Asarum europaeum*, *Helleborus*, *Paris quadrifolia*, *Digitalis lutea*, *D. grandiflora*, and *D. laevigata*. The common Gentian on this mountain is *Gentiana aestiva*; it is a vigorous form of *G. verna*, and is said to grow in drier places than those in which our native species can thrive. On the 19th we caught the 11 P.M. train to Stara Zagora, arriving there at 9.30 A.M. the next morning. The O'MAHONY conducted us to the Bishop's house, where our breakfast consisted of a cup of Turkish coffee and a cigarette. After this refreshment we had a look round the town and the park, and later in the day went off botanizing to a dry limestone hill a few miles away. Twining among bushes *Clematis Viticella* gave abundance of its purple flowers. *Spartium junceum* was a blaze of yellow, while *Dictamnus Fraxinella* was in flower and everywhere around *Achillea clypeolata* raised its yellow heads. This species and *A. pseudopectinata* are the parents of the beautiful *Achillea* × *Kellereri*. *Ajuga Laxmanni* is a quaint addition to the Bugle flowers; it has strong hairy stems, 2 feet high, with striped brownish yellow flowers more curious than beautiful. The silver-leaved *Convolvulus Cantabrica* with pink flowers seemed to enjoy the heat, while the white-leaved *Teucrium Polium*, Eryngiums, Linums, and *Thymus zygioides* were also plentiful in this locality.

On the 21st we drove to Kasanlik, where we stayed at the Monastère des Religieuses. At 5 o'clock next morning we started off and rode over the Shipka Pass to Gabrovski Monastery, which we reached at dusk, illumined now and again by the numerous fireflies flitting to and fro. Near the monastery are some interesting white and yellow Onosmas, and one sees eagles and vultures soaring over the mountain tops. The Shipka Pass in places is broad and easy, but also winds

through gullies and shaded woods. Near the summit it is bare and open and the sun beats down upon hardbaked rocks. We passed by obelisks and grass-grown trenches marking the spot where, in 1878, terrific battles took place between the Bulgarians combined with the Russians against the Turks; one battle lasted seven days. In the end the Turks were defeated and Bulgaria gained her independence.

Several species of *Cytisus* are found on the Shipka Pass, the most noteworthy of which is *C. leucanthus*, or *C. schipkaensis* as it is sometimes called. Along a shady beechwood path we passed by a cliff covered with *Haberlea rhodopensis* (fig. 2) in company with *Asplenium Ceterach*. The *Haberlea* was in full flower, some of the larger tufts being 2 or 3 feet across, and it was a glorious sight. We luckily found a tuft with almost white flowers. Higher up the cliff, where the shade was absent, the leaves were burnt and shrivelled, and yet the plant manages to exist. There also we found the wild Lilac.

Leaving Gabrovski we drove through the Shipka village along the Valley of the Roses to Kasanlik, where the attar of roses is made. Kasanlik lies on the plain of Thrace, and, like many other of the Bulgarian plains, is absolutely flat with high mountain ranges rising precipitously around. The valleys give the impression of dried-up lakes.

The world's chief supply of attar of roses comes from this district, for it is the biggest rose-garden known, stretching 80 miles with nearly 170 villages devoted to the culture of roses. The soil is sandy and porous, but well watered by numerous streams. The rose which is grown for the attar is a variety of the Red Damask Rose (*Rosa damascena trigintipetala*). Often around a plantation is a single or double row of a white rose, a form of *R. alba*. The rose bushes are grown in rows, forming hedges about 100 yards long and 6 feet apart in the rows. New plantations are formed by cutting down the old stumps and dividing them, usually in October or November. A plantation will be in its prime five years after planting and, if carefully tended, will last fifteen to twenty years. Rose-picking takes place every day from about the middle of May to the middle of June, and the flowers are gathered, calyx and all, early in the morning before the sun shines upon them, otherwise they yield much less attar. A hectare (2½ acres) produces about three million flowers, but it takes about 100,000 flowers to make an ounce of attar. When picked the roses are taken direct to a covered shed where stills are at work. A still consists of a copper alembic, about 4 feet high, into which the roses are put. It rests on a brick furnace, and has a mushroom-shaped head, and from it a cooling tube passes into a trough of running water. Under the cooling tube a flask collects the distilled rosewater. This rosewater is again distilled and the attar collects on the top in the form of a yellow, oily liquid.

Passing vineyards here and there, and sampling some wonderful fine black cherries and mulberries, we drove along the Kasanlik plain to Stara Zagora, seeing many strange birds, also the girl rose-pickers

FIG. 1.—DIANTHUS MICROLEPIS.

[*To face p.* 4

FIG. 2.—HABERLEA RHODOPENSIS.

FIG. 3.—DIANTHUS GRISEBACHII.

FIG. 4.—CAMPANULA MOESIACA.

dancing the Horo, a national dance accompanied by an instrument like the bagpipes.

Near to Stara Zagora we collected the quaint little *Iris mellita* on limestone ground. It is a suitable plant for the rockery, producing, in early spring, flowers of a smoky-brown colour with deeper veins. We also saw several bushes of *Rhus Cotinus*, known as the "Venetian Sumach" or the "Smoke plant," the hairy lengthened pedicels giving the shrub a very ruddy colour, but near Philippopolis we saw it in full glory growing by the acre, a veritable field of flame.

South of Philippopolis the Rhodope Mountains are limestone, and here the *Haberlea* grows in quantity. In summer the leaves get badly burned by the sun and heat. *Saxifraga porophylla* grows with the *Haberlea* fairly low down, and higher up the mountains *Saxifraga Stribrnyi* may be found.

From Stara Zagora we took train to Kostenetz, *via* Philippopolis, and enjoyed the hospitality of The O'Mahony at his mountain home. In his pretty garden was an interesting Thorn tree, with very large leaves, collected in the adjoining mountains. From a specimen I brought back, Kew has pronounced it to be the true *Crataegus altaica*, Lange, a very rare tree. The black-fruited Thorn, *Crataegus melanocarpa*, was also collected at Tzaribrod near the Servian border.

On the 26th we started off with The O'Mahony as guide to the snow-topped Bellmaken mountains. The road runs by the side of a tributary which flows into the Maritza, and along the banks were such plants as *Actaea spicata*, *Sambucus racemosa*, *Geum rivale*, *Thalictrum aquilegifolium*, waving feathery plumes of flowers, and large groups of *Bupthalmum speciosum* coming into flower. Further on we came across the alpine Clematis (*Atragene alpina*) always beautiful with its long spraylike growths spangled with stars of blue. *Campanula lanata* grows from small crevices in the rocks, its shoots radiating from the main stem, but all pressed to the rock-face. *Geum bulgaricum* was also on the rocks. It is the largest-leaved species I know, some of the leaves measuring nearly a foot across; the plants are covered all over with glands, making it very sticky to touch; the flowers are disappointingly small, cup-shaped, of a pale yellow, nodding from stems 9 inches to 2 feet tall. A log hut gave us shelter for the night with a bench of boards for a bed, but one has just as good a chance of a night's sleep on these hard boards as in some of the monastery beds. Near our resting-place, 5600 feet altitude, *Pinus Peuke* was growing in quantity. The trees were of narrow pyramidal outline, reaching a great height. The young shoots are bright green, bearing leaves about 4 inches long on tufts at the end of the branches. The cones were rather small, about 4 to 5 inches long. Some of the trees were disfigured by the natives tapping them for resin. The following day found us on Bellmaken, and we collected or saw the following plants: *Lychnis Viscaria* and *L. coronaria*, *Arabis procurrens*, Veratrums, *Soldanella pusilla* and *S. montana* (with white forms of each), *Primula*

minima and *P. deorum*, *Lloydia serotina*, *Gentiana punctata* and *G. pyrenaica*. A most interesting plant on Bellmaken is the true *Rhododendron myrtifolium*. It is a pretty spreading shrub, the leaves are oval, only ½ to ¾ inch long, scaly on the underside, and the pink flowers are diminutives of the Alpenrose (*R. hirsutum*).

On the 29th we said good-bye to The O'MAHONY and I then saw Mr. COWLEY off at Kostenetz station on his homeward journey. With a Bulgarian companion I left the railway and drove across country to Tchamkouri, where I was to meet Herr KELLERER. For three days there was a continual downpour of rain, and we learned that the road to Rilo was washed away and also part of the railway to Sofia, so it was a case of having to stay. Tchamkouri is near the Rhodope mountains, about 50 miles from Philippopolis, pleasantly situated in the Pine and Spruce forest, and many of the townspeople spend their summer holidays there in pretty wooden houses. One sees buffalos and large slaty-grey oxen drawing timber, and in some villages we saw oxen on their backs with their legs tied to a pole and the blacksmith busy shoeing them; also it is curious to see beech and oak branches dried to use for winter fodder.

With Herr KELLERER I visited the gardens at the Prince's and King's beautiful mountain homes not far from Tchamkouri. Each one has a rock garden where many difficult alpines thrive, such as rare Gentians, Daphnes, *Androsace glacialis*, &c. On the hillside near the gardens, 4000 feet altitude, *Carlina acanthifolia* is plentiful, its large thistle heads, 6 inches across, resting upon rosettes of leaves lying flat on the ground. *Silene Lerchenfeldiana* grew in the crevices of rocks; another quaint species had round capitate heads of white flowers, while plants of *S. macropoda* brought to Glasnevin seem to be evening-flowering; the flowers are small and white with buff reverse. In stony places Sempervivums were frequent; *S. Pittoni* with yellow flowers and pretty ciliated leaves is very pleasing. By the side of these *Dianthus Noëanus* was growing. In cultivation it is making a cushion of hard spiny foliage and bears white fimbriated flowers; it is rather like a large *D. petraeus*. In another place I collected *D. Grisebachii* (fig. 3) with soft foliage more in the way of our *D. deltoides*, but having bright crimson flowers prettily zoned. On another excursion we found a showy *Linaria* dwarfer than *L. dalmatica*, but larger in the leaf and flower; also a tall Bellflower which Kew say is probably *Campanula moesiaca* (fig. 4). Under good conditions it is a beautiful plant, growing 2 to 2½ feet high, with narrow radical leaves and the hairy flower-stem clothed from top to bottom with sessile and erect bells of a pretty pale blue. Unfortunately it seems to be only of biennial duration. Another walk was along the Belliskr stream. Here the upland meadows rival those of Switzerland; the beautiful *Polygala major*, a foot high, clothed in blue, white, or pink flowers, mingles with the annual Gentians, and is topped by tall Umbellifers and *Spiraea Filipendula*. In places there were colonies of *Botrychium Lunaria* and *Orchis sambucina*, *O. latifolia*, *O. Simia*, &c. In the same way

as the Ling covers our hillsides so does the *Bruckenthalia spiculaefolia* form a carpet on some of the mountains.

On Sunday, July 2, we left the firwoods behind for a walk up Moussala, the highest mountain in Bulgaria, about 10,000 feet high. On account of the heavy rain the rocky path was more often a mountain torrent, and prickly Junipers formed a verge. We came across many plants which have been already noted; also *Pulmonaria rubra*, in shady places; *Campanula Steveni*, in both shady and sunny places; *Doronicum Orphanidis*, in moist spots, was 4 to 5 feet high; while the dwarfer *D. Columnae* (*D. cordifolium*) gave colour to the banks with its bright yellow flowers. The scenery was bold and rugged, the path winding between mountains; bears had left imprints in the soil, and now and then we had a glimpse of the snow-capped Moussala in the distance. The last of all trees on the mountain-side is *Pinus montana*; its branches sprawl along the ground for many yards, and then become erect; only a few trees are upright from birth. In some districts it covers acres, and is valued by the peasants for firewood, and is known as "Klek." *Primula exigua* or *P. farinosa denudata* is a pretty form of the Bird's-eye Primrose without farina on the leaves. Then we came across a great stretch of *Primula deorum* at its best. Having known the plant only in cultivation I had no idea it could be so beautiful. In the full sun the thousands and thousands of half nodding rich purple violet flowers were a feast for the gods. The site was a moist, grassy meadow. This Primrose seems to insist on moisture for its well-being, many of the plants growing by streams with roots actually in the water. Near by we collected *Gentiana pyrenaica* with its purplish flowers, and the little *Campanula orbelica*, a relative of *C. alpina*, but neither of the plants seem happy at Glasnevin. At the end of this grassy glade are inland lakes which are the source of the Maritza River, which flows into the Ægean Sea. The path gets steeper as we get on the rocks, and here we see *Arenaria biflora*, *Senecio carpaticus*, *Alsine sedacea*, *Gnaphalium supinum*, *Veronica bellidioides*, *Potentilla Haynaldiana*, *Saxifraga cymosa*, *Ranunculus crenatus*, the Willow Gentian, and also *G. frigida* with large white flowers on stems but a few inches high. Herr KELLERER has a fancy for the neat little *Plantago gentianoides*, but the silvery leaved *P. argentea* appeals more to me, and is well worth growing for its foliage.

Getting near the summit we cross stretches of snow, and on shelves and in crevices of the rocks the Fairy Primrose (*Primula minima*) forms wonderful masses of flower, and right up to the top we come across *Saxifraga juniperina* flowering freely, *S. retusa*, *S. bryoides*, *Anemone vernalis*, *Geum reptans*, and the beautiful *Dianthus microlepis*. When we gained the summit the mists cleared and a grand view opened out. Southward were Macedonia and Turkey, and on the north the progressive country of Bulgaria.

SOME FLOWERS OF EASTERN AND CENTRAL AFRICA.

By Miss M. H. Mason, F.R.H.S.

[Read February 11, 1913; Dr. A. B. Rendle, F.R.S., in the chair.]

This sketch is intended to be neither botanical nor horticultural, but simply descriptive of the flowers as they grew wild, in their own homes.

Interesting as is botany, and delightful as are gardens, nothing, to me, comes up to the joy of nature itself, and of finding flowers growing wild in country which has never been cultivated, and especially if it has never been visited, or scarcely, by white people.

In September 1910 I went to South Africa to visit one of my brothers, who had been for four years Principal of St. Bede's College, Umtata, Tembuland. St. Bede's College is for the training of native clergy; Umtata is the capital of the Transkei; and the Transkei, or Transkeian Native Territories, or Kaffraria, is a native reserve lying between Cape Colony, Natal, and Basutoland and the Drakensberg. It is a country very little known, and I have described it in an article in the *Nineteenth Century* for March 1913.

Its coast border is Pondoland, and its one small port is Port St. John's, at the mouth of the Uzimvubu River—one of the most beautiful places in the world, and possessing one of the most beautiful floras.

In my brother's college vacations we made many journeys together. The first Christmas we took a Cape cart and horses, and drove 400 miles over the most remote parts of the Transkei. Our journeys were made in connexion with the work of the college, but they took us to out-of-the-way places, where the flowers were both beautiful and little known. And as we travelled by our own cart we were able to stop whenever we pleased and secure flowers, seeds, or roots. Moreover, we walked up all the steep hills to save the horses, and gathered by the way.

Twice besides I have been to the Ngadu Forest, in the Transkei, for a week at a time.

Besides making other short visits in the Transkei, we stayed some time at Port St. John's. In the winter vacation—July and August—we went down to East London, and from there by sea to Durban and the Natal coast. From there again by sea to Lourenço Marques and Beira, and thence by rail through Portuguese East Africa to Umtali and Penhalongha, in Mashonaland. We went on to Rhodesia—Salisbury, Buluwayo, the Matoppos—the Victoria Falls, and Livingstone, and a little way up the Zambesi. We returned by Bechuanaland and Johannesburg to Durban, and from there home the same way to Umtata. At all these places, and wherever the train stopped, we got flowers, and I drew them.

Fig. 5.—Small Alpine Nerine. Transkei.
Colour, light pink.

[*To face p.* 8.

Fig. 6.—Berkheya purpurea, near Cala, Kaffraria.
Colour, bright lilac.

Fig. 7.—Tritonia (Montbretia) new, not yet named. Kaffraria.
Colour, scarlet orange.

FIG. 8.—SCILLA (?NATALENSIS) (BLUE) AND TRITONIA (ORANGE). TRANSKEI.

FIG. 9.—DIERAMA PENDULA VAR. PUMILA. STANGER, NATAL.
Colour, light pink.

Fig. 10.—Haemanthus grandiflorus, growing in the sun. Tembuland. Colour: bracts, deep crimson; flowers, yellow, orange, and green.

FIG. 11.—HAEMANTHUS GRANDIFLORUS, GROWING IN THE SHADE. TEMBULAND.
Colour : bracts, green ; flowers, yellow, orange, and green.

FIG. 12.—DIERAMA PENDULA AND D. PULCHERRIMA. TRANSKEI.
Colours, deep pink, pale pink, claret, and black.

[*To face p.* 9.

In the last Christmas holidays we took a cart and horses again and drove another way across Kaffraria to Kokstad, in East Griqualand, and then to the railway which is being extended across the mountains from Natal. This was one of the most flowery districts to which we have been. From Pietermaritzburg we went by train through Ladysmith and Harrismith, and over Van Rienen's Pass to Bloemfontein, and then to other parts of the Orange Free State, and to Basutoland, paying visits all the time, and home to Umtata another way, through Sterkstroom to Indwe. From Indwe we took another cart, this time with mules, and drove back that way to Umtata.

When I left South Africa I returned to Cape Town, and came home by the East Coast in a German ship, stopping at Port Elizabeth, East London, Lourenço Marques, Beira, Zanzibar, Tanga and Dar-es-Salam, in German territory, and landed at Mombasa, whence I went up into British East Africa, and across the Mau Mountains and Lake Victoria Nyanza to Uganda, then back to Mombasa, where my flower-hunting ended. I drew flowers, in water-colour and life size, which I found at all the places or on all the journeys mentioned. I had no previous intention of doing this, but was tempted by the strange forms and wonderful colours to sketch them, solely to show to my brothers and sisters in England. Thus I was drawn on by first one and then another, till, all unintentionally, I made a collection of four hundred paintings, which I have now left, by will, to Kew.*

My drawings were not intended to be pretty pictures, nor were they meant to give minute botanical details, but simply to show the flower as it grew, and alive. They were in fact reports. I made also a large number of landscape sketches for the same purpose. The drawings were not the object of my travels, but were done amongst much other work and at all odd times, many when on trek, many in shaky trains, and many on board ship—in books, and generally on my knee.

I have been three times to Cape Town and the neighbourhood, at different times of the year, and for weeks at a time, but I have drawn very few flowers there partly because I had too little time; and partly because the flowers of that region, the most beautiful in the world, have been, and will be, drawn by others. I sketched those that are less known in order to show them to those who could not see them otherwise.

I should be very sorry if anything I said tended to encourage the wholesale importation of Cape bulbs. There is already far too much destruction going on at the Cape, and it is much to be wished that the regulations there for their protection should be made more stringent and more efficiently enforced; otherwise the time is not far distant when some of the heaths and bulbous plants will be exterminated. What is wanted is that they should be grown, cultivated, and increased

* This itinerary was given in order to show the places in which the flowers portrayed in the 100 water-colour sketches exhibited on the occasion grew.

in nursery gardens both at the Cape and in England, or, if England is not suitable for all, in the Channel Islands or Scilly—where many of the Cape bulbs, such as Ixias and Freesias, do even better than in their native land.

I brought or sent back a considerable number of bulbs, seeds, and some plants from the various parts of Africa I have mentioned, but very few from the Cape, and those were given to me from private grounds. They have been grown by my brothers in England in their glass-houses, and at Kew and Cambridge. Most of them are at Cambridge, in the charge of Mr. LYNCH, the Curator of the Botanic Gardens, whose care, skill, and patience it would be difficult to overrate.

His first success was with *Chironia laxa*, a pretty little plant with small pointed leaves and bright pink flowers, very suitable for a conservatory. He raised it from seed sent home by my brother from Tembuland before I went out, and it has not only flowered, but seeded abundantly. Mr. LYNCH sent a plant in flower to my brother at Canterbury, and one to Kew. It has done equally well at both places. Numbers of young plants have been raised both from seed and cuttings. It has been figured in the *Kew Bulletin*.

Mr. LYNCH has also grown and flowered *Sansevieria parva*, which I took up in the forests near Nairobi last July. It is a really pretty thing with purplish flowers, very bright shining leaves, and is of a manageable size. We have several good plants.

Another very successful thing is a tiny pink *Nerine* (fig. 5). It would seem, structurally, to be much the same as *N. filifolia*, according to herbarium specimens. But its growth, when alive, seems quite different. It is like an alpine plant, dwarf and delicate, and grows on high ground among flat slabs of rock in wet peat. I have only found it twice, in two places in the Transkei about fifty miles apart. It would seem to be a new species—a very pretty acquisition for a conservatory, and still more so, if it were hardy enough, for a sheltered rock garden. I sent a quantity of bulbs home to one of my brothers, and it has blossomed and seeded plentifully in pots.

A very large pink Gladiolus was photographed from one of my drawings in the number of *Country Life* for February 15. My brother in Tembuland has grown it in his garden. We sent some bulbs home, and they are doing well, but have not yet had time to blossom. The species of *Gladiolus*, *Watsonia*, *Antholiza*, and *Tritonia*, run into one another, so that it is really impossible always to define them. One very common but beautiful scarlet *Antholiza* which I drew from plants growing in Bomvanaland seemed to be a *Watsonia* when I found it again some sixty to ninety miles off! I should have drawn it to show the difference, but had no time to sketch it with the many other things found there.

Montbretias are now called Tritonias; but, though they may belong to the same genus, they are very distinct and their name may be very usefully retained. *Montbretia Potsii*, one

of our oldest, if not our first, cultivated species, grows in East Griqualand by the edges of the streams in the valleys or lower grounds. It is very handsome and showy growing thus in great groups or bunches. My brother and I found a new and very distinct species growing in a very different situation and manner high up on the mountains, and hanging among ferns over a little waterfall (fig. 7). It was so large and bright that we both shouted and ran towards it on seeing it simultaneously from different points. Its colour is more orange than *M. Pottsii*; the flowers are very much larger, flatter, and more open; and it falls over, with the flowers clustering all on the upper side after the fashion of an *Odontoglossum*, and standing upright, almost at right angles to the stalk and hiding it, whereas *M. Pottsii* grows almost upright, and the flowers spread out rather flat on each side of the stalk, rather sparse, and leaving the stalk very visible. The leaf, too, is quite different, much broader, and sometimes from two to three inches across. I met nearly all the botanists at the Cape and others elsewhere. No one had seen our Montbretia, till I found it at last in the herbarium of the late Dr. BOLUS, now in the possession of his niece, formerly Miss KENSIT, and now Mrs. F. BOLUS. My brother and I found it on January 19, 1911. Mrs. BOLUS now referred to her uncle's diary, and there it was recorded as found by him, in what seems to have been the very same place, and almost on the same day of the year—January 20, 1896. He had considered it a new species, and had sent a dried specimen to Kew, where I looked it up on my return home. But it was so poor and unrepresentative a specimen that it was taken for *M. Pottsii*, and I could myself find little to distinguish it. My brother and I brought some bulbs home to Umtata, and planted them in his garden there. Next year one of them blossomed, and had become even finer; it was simply magnificent. My brother has written, since I returned home, that it has flowered again this year, and has three sprays in blossom. I sent some bulbs home, and hope that they are coming up at Cambridge, but it is not possible to distinguish them yet. Anyhow, I can get some more from my brother, and I anticipate that it will be one of the most remarkable additions we have had for some time to our garden list. I see no reason why it should not be hardy, seeing that it grew on higher ground and in a colder situation than *M. Pottsii*, which does so well in the open border here.

The Dieramas, formerly called Sparaxis, have never been properly classified and named. Only two names have been given to the group, *D. pendula* (or *cernua*), with *D. pendula* var. *pumila*, and *D. pulcherrima*. There are, besides, several other species in the Transkei, some of them of upright growth; and there are specimens of some of them, unnamed, in the herbarium at Kew. *D. pulcherrima* would seem to have been so named from its bright pink colour, for it does not seem to differ in any other respect from *D. pendula*. And the 'var. *pumila*' (fig. 9) is really a distinct species, with flowers much smaller and much more numerous. My brother has a large plant of it with any number

of stalks, from which hang showers of pale pink blossoms. It is certainly not as tall as *D. pendula* or *pulcherrima*, but there is nothing dwarf or reduced about it. It is quite distinct. I have found it also in Natal.

D. pendula or *pulcherrima* is widely distributed. I have seen it on the hills between Alicedale and Grahamstown, as well as in various parts of the Transkei. In East Griqualand we found a tall, large-flowered one pure white. None of any other colour grew anywhere near it. But in another part of the Transkei we found *D. pendula* of all colours growing together on the top of a wind-swept hill. They were of the deep pink of *D. pulcherrima*, a pale lilac-pink, some white, and some a deep claret, of which the buds were quite black (fig. 12). We brought back bulbs of all these to the Tembuland garden. We have another there which is almost blue, something of the colour of a purple crocus, and of its shape upside down. We are not quite sure where it came from ; probably it was not in blossom when we dug it up. All have not only flowered but seeded so well that from the seed I sent home they are coming up in my brother's greenhouse at Canterbury, at Kew, and especially at Cambridge, in quantities like grass, and I hope to have a large collection from which not only to classify the species, but to distribute. They ought to be fairly hardy, for they grow in coarse grass on hilltops without any shelter, and have a good deal of frost in the winter. I remember seeing what I believe were Dieramas some years ago in a sheltered part of the late Mr. EWBANK's garden at Ryde. He pointed them out to me as Cape bulbs which he had succeeded in growing in the open. They also grow out of doors in the R.H.S. Garden at Wisley.

I have been asked why, in describing flowers, the Cape botanists never mention their colour. The reason is that they generally regard colour only as a local incident, not an inherent property or distinguishing feature. It is quite true that colour varies in Africa almost more than anywhere else ; and from my own observation of the Dieramas growing wild over a very large area I should say that BAKER was misled by the colour of what he called *D. pulcherrima* into making a distinct species of it ; and that he was misled in the same way into calling *D. pendula* var. *pumila* a mere variety.

Take, for instance, the Cape Babianas. On Table Mountain they are of a bright magenta pink. In the Claremont woods, at the foot of the mountain, they are of the most lovely lavender blue. On the Cape Flats, near the foot of Sir Lowry's Pass, they are of a very dark blue, much the colour of the common blue flag iris of our gardens at home. A little way up Sir Lowry's Pass they are again of a lavender blue, but greyer, paler, and not as bright as in the Claremont woods. And at Caledon, further south on the mainland, they are of all shades of magenta pink down to pure white.

I have not dissected any of these flowers, but from ordinary observation I have not perceived any structural differences.

Again, I have noticed that a very common *Felicia*, a bush like

FIG. 13.—CHIRONIA PALUSTRIS VAR. FOLIATA. KAFFRARIA.
Colour, bright pink.

[*To face p.* 12.

FIG. 12.—SCHOTEA VENUSTA. KEI BRIDGE PASS.
Colour, brightest crimson.

FIG. 15.—TECOMA (OR PODRANIA) MACKENZII. "ST. JOHN'S CREEPER." EAST PONDOLAND.

Colour, pale pink.

the very brightest of blue Michaelmas daisies, which grows in quantities on Table Mountain just above the houses, fades gradually on the way to Caledon, till it is quite white when it arrives there.

The train crosses the Drakensberg very slowly over Van Rienen's Pass, between Ladysmith and Harrismith, by a series of zigzags, so that one has good opportunities of seeing the flowers on the banks, though not of getting down to gather and examine them. Here the *Aristea*, which is of the most brilliant blue in the Transkei mountains is quite pale ; the tall gladioli are pale too ; and *Hyacinthus candicans* (properly *Galtonia princeps*), which with us retains the greenish colour it has in the Transkei and the Eastern Cape Province, whence it was brought, is of the purest white. It has also a larger flower bell, and is really much prettier than ours. I have seen it also grown in a tin at Bloemfontein. It may be a different species, but as all the flowers in the same part were paler, it would seem as if it only fell in with the rule. Our *Hyacinthus candicans* grows on the edges of the forests, and on the banks of level streams.

Driving over the plains near Bloemfontein I have also found the lovely little *Aptosimum depressum*, which is of the brightest blue on the Karroo, quite a pale dull grey. Colour varies much more in Africa than in Europe. Yet it should not be altogether ignored as a distinction, for some flowers, especially the scarlet, never vary, or at least only vary in shade.

As to the scarlet and crimson colours, especially those of the aloes and Kafir boem (*Erythrinum*), no paint can give it. They seem alive and to give out living flame. And though we may be able to grow and flower some species, we cannot reproduce their wonderful colours. We can provide as much heat as we like in our plant houses, but we cannot provide the fierce sunlight which brings out the colour. Take, for example, that big flower, *Haemanthus grandiflorus*. I drew two examples growing side by side—one under a bush, the other in full sun. The cup, composed not of petals, but bracts, is the brightest and deepest crimson in the sun, and firmly upright. The flower looks like a great tulip. In the shade the bracts are larger, and are green, and they fall over and hang down. It does not look like the same flower, yet it is, and this is only the effect of the sun and its absence. If this is the result in the home itself of plants, we need not be surprised at it here (figs. 11 and 12).

Our blue *Agapanthus* is an instance of varying shade but not of colour. Near Umtata, in Tembuland, it grows on the precipices above the river an enormous size and the same blue as we see here. This is the usual colour. But at Kokstad, in East Griqualand, I have found it rather smaller in size, and of all shades, from the very darkest blue to the palest grey, though not white. Nothing can be more beautiful than a clump of perhaps fifty such blossoms together on the rocks. The smaller kind (*A. minor*), however, never varies from its medium dark blue wherever I have seen it over a very large area. One well-known Cape botanist declared to me that it was only an

accidentally smaller growth of *A. umbellatus*. In this I must venture to disagree with him.

Some beautiful species of *Disa* grow in Kaffraria. I sent back some fine plants of *D. crassicornis*, which grows in the Umtata district, but I fear that the bulbs have disappeared. It grows about one and a half foot high, and has very large flowers, white shaded with lilac. We found one plant only of *D. pulchra* in the East Griqualand mountains on the Natal border. It is of a bright pink and one of the most beautiful of the genus.

The Eulophias are among the most interesting of the orchid tribe. I sent back a number of them, but cannot as yet tell if they will come to any good.

Several kinds of *Crinum*, *Brunsvigia*, *Cyrtanthus*, *Drimia*, and other bulbous plants seem to be doing well. *Drimia macrantha* is more curious than beautiful, growing three to four feet high, with leaves coming up after the flowering is over, and with flowers usually brown and yellow, turning back like a *Martagon*. It only opens—that is, turns back—at night, and I had therefore to draw it by gaslight. It has a very strong, sweet scent at night only.

Most of the flowers I have mentioned grow in South-East Africa, but there are many of great interest and beauty also in British East Africa and Uganda. The Mau Mountains, between Nairobi and Lake Victoria Nyanza, rise to a height of some thousand feet, and are therefore cold enough for some of their indigenous plants to have a good chance here.

The railway goes over a pass 8000 feet above the sea level, and whenever the train stopped, either on purpose or by accident, I and my kind fellow-passengers jumped out, and we collected a good number of treasures. To a breakdown of the engine I owe *Delphinium macrocentron*, whose lovely upright spikes of steely blue were growing among the long grass in quite park-like surroundings. I have since secured a quantity of good seed, and have a large crop coming up, which will be for disposal in due course.

As a rule the wild plants occur singly, not in masses. But near Cape Town, especially, our huge white Arum grows in thousands together in the marshes, particularly in the road to Simonstown. It also grows in sheets in Robben Island, the lepers' place of isolation. It grows thus, in quantities together, all over South Africa where there is water, but I have never seen it in such large quantities as near Cape Town. It grows singly, or a few together, according to the size of the moist places it finds.

Much the same may be said of our 'red-hot poker,' *Kniphofia aloides*. I have seen this growing in the marshy bed of a stream at Blythswood, in the Transkei, where, mixed with the tall scarlet marsh or river *Antholiza*, they formed a real street of red, extending for hundreds of yards. But this is the only place where I have seen it in masses, though I have seen it growing singly, or in single clumps, all the way from near the Cape up to the boundary of British East Africa

and Uganda. The green, or green and yellow, *Kniphofia* seems to have the same habit. It flowers in the spring, whereas the common red one blossoms in the summer and autumn. In one place near Umtata, in Tembuland, acres of it, of all shades of green and yellow, were growing in a marshy hollow where a small stream winds about. But I have always seen it singly elsewhere. In some of the Kaffrarian marshes there are sheets of pink *Chironia palustris* (fig. 13).

In the spring—that is, September and October—there are sheets of yellow Composites and of Mesembryanthemums, both yellow and red, near Cape Town. But, as a rule, there is nowhere in South or Central Africa, as far as I have seen, anything like the effects of colour produced by sheets of only one kind of flower, such as minor Convolvulus, marigolds, and pink goat's-foot in the Algerian Atlas, or a wood of English bluebells, or of primroses, or wood anemones, or fields of cowslips or marsh buttercups, or like the acres together of *Primula farinosa* or blue pansy or *Myosotis* in Switzerland; still less such lilac seas as the miles of cuckoo flowers (*Cardamine*) in the fenceless meadows on the boundaries of Eastern France and Switzerland. Perhaps the nearest thing to the colour of a wood full of bluebells is the blue or purple *Plectranthus*, which grows in tall, thick masses in the forests of Kaffraria, much as rhododendrons do when run wild in Surrey.

The great feature of the Cape flora is its endless variety. The ground is literally enamelled with flowers of all kinds and colours, shrubs as well as ground plants. Table Mountain and many parts of the Peninsula and the neighbouring country are truly like gardens. This wealth, however, diminishes northwards, and there, though the flora is both varied and beautiful, it is much more scattered.

With regard to the distribution of the African flora—taking the line of the railway northwards inland—the genera more peculiar to the Cape, such as Heaths, Proteas, Babianas, Ixias, and other bulbous plants, extend, with varying species, southwards to Cape Agulhas, the real southern point of Africa, and northwards, after a rather barren interval before the range of mountains is reached through which the train passes, through the long valley of Worcester, Ceres, and other towns, to the foot of the Hex Mountains. Here the flora changes at once, and a rugged mountain flora appears. The first wild red Aloes are seen here.

From these heights the train descends to the Karroo, which is almost entirely clothed with succulent plants, able to retain their moisture through long droughts. In the spring, after rains, there are sheets of colour here from Mesembryanthemums, Gazanias and Zinnias, but at other times the vegetation is chiefly a dull grey-green. This tract extends a long way northwards, beyond De Aar, and eastwards again towards Port Elizabeth. But on the Port Elizabeth line flowers begin again somewhere near Cookhouse, and of quite a different type. Aloes of more than one kind, including the tall *A. ferox*—Cotyledons—the bright crimson semi-creeper *Cadaba juncea*, and others not previously seen, grow here—a rich and beautiful variety—and when

Alicedale, the junction for Port Elizabeth and Grahamstown, is reached, there is a quite new set. Here the blue Plumbago of our greenhouses begins. It is grown at the Cape, but only in gardens, and chiefly as hedges, but is not wild there. But from here it grows northwards to the Transkei and perhaps beyond. With the Plumbago, near Alicedale, grows the parent of our scarlet Pelargonium, and the climbing ivy-leaved Pelargonium as well; this latter extends a long way north, but I have not seen the scarlet elsewhere. On the high rounded hills and downs between Grahamstown and Alicedale the more northern flowers begin—which reach to Natal—and are mixed with some of the Cape bulbs. But the change from the Cape flora would seem to begin here, or about Port Elizabeth, along the coast.

As I have not followed the coast along the land I cannot judge more exactly as to where the changes of flora take place along the seaboard. But, as far as I can tell from touching at the various ports on sea voyages, the character of the Cape flowers would seem to be preserved more or less as far as Port Elizabeth. At East London it is very different, though of course there are some plants whose distribution is very wide. For instance, I have seen the pretty blue *Ponlaxisia variabilis* in Kaffraria, Natal, and British East Africa, near Nairobi, and Gladioli grow from the Cape to Uganda. But, generally speaking, the flora is entirely changed as far east or north-east as East London, where palms and *Strelitzia Reginæ* grow. East London is not far north of Cape Town. On the Pondoland coast the vegetation is sub-tropical. Here are Palms, Draceenas, *Strelitzia Augusta*, Dombeyas, Gardenias, Tecomas (fig. 14), and other flowering shrubs cultivated at Cape Town. The flora and vegetation of Natal are again different, with individual exceptions. And again, those of Portuguese East Africa merge into those of German East Africa; while at Mombasa there is a complete change. Then, beyond the Athi plains where range the herds of wild animals, when the cooler and higher regions of Nairobi are reached, all is different again—and though species vary, many of the same genera are found on the other side of Lake Victoria Nyanza, even in the much hotter climate of Uganda.

To take another line, while the inland forests of Portuguese East Africa have some of the plants or tribes of those of the Pondoland coast, the flowers of the country, generally, are not at all the same as those further south; but their characteristics are to a great extent preserved through Mashonaland and Rhodesia, to the Victoria Falls.

Bechuanaland is dry, flat, and monotonous. In passing through by train we saw but few flowers, the prettiest being a little yellow *Mesem.*

The Orange Free State, Transvaal, and Kaffraria, inland, would seem to share many of the same characteristics, the plains or open country, of course, differing from the rocky and wooded mountains.

Since writing this I have compared notes with the Herbarium authorities at Kew, and find that their experience of distribution, from specimens received, coincides with the lines I have drawn from personal and open-air observation.

[*Photo: W. H. Divers.*

FIG. 16.—SPRING FLOWERS AT BELVOIR CASTLE.

[*To face p.* 16.

FIG. 17.—SPRING FLOWERS IN THE DUCHESS' GARDEN, BELVOIR CASTLE

THE SPRING FLOWER GARDEN.

By W. H. Divers, V.M.H.

[Read March 4, 1913; Sir J. T. D. Llewelyn, Bart., V.M.H., in the Chair.]

The furnishing of the Spring Flower Garden is a subject worthy our consideration for several reasons. There is much room for development and improvement in our treatment of spring-flowering plants. They appeal to everyone, and to many far more than the summer occupants of the garden. The frequency with which they are referred to by our poets is well known. Many of the lines are often quoted and I do not intend to weary you to-day by repeating them, but one of the earliest is found in the Song of Solomon—"The flowers appear on the earth; the time of the singing of birds is come, and the voice of the turtle is heard in our land." Spring flowers were evidently appreciated 3000 years ago. Everyone knows how many Shakespeare mentions, and Wordsworth has many references to them, he who was such a lover of nature and lived in such picturesque surroundings. I have known people who would walk a long distance to see the first Snowdrop and the first Primrose; there is something very wonderful in the way these little bulbs and plants feel the influence of returning warmth and sunshine.

One of the chief things to be considered in the cultivation of these early flowers is the formation of the garden, and the shelter they will receive, either from the situation of the ground or from surrounding objects such as trees and similar things. Few, I imagine, have such natural advantages as we have at Belvoir, and I will ask you kindly to excuse me if I refer to our garden too often in the course of my lecture, for I cannot easily imagine a better situation. It is formed in this way. We have a range of hills running mainly from east to west, in many places very narrow on the top, and rising sharply about 200 feet above the level of the surrounding land. There are many evidences that this range was left in some far distant past when the valleys close by were formed by water agency; when this happened many nice curving recesses were formed along the hillside as the waters swept along, and in one of these our Spring Garden—or, as it is usually called "The Duchess' Garden"—is situated; it has the form of a horseshoe, and is open to the S.E., covers about 8 acres, and has a fall of 100 feet from the top to the bottom. When I add it is surrounded on all sides by tall forest trees you will see what a nice warm place it is in the winter and early spring; it catches every ray of the sun, and usually feels many degrees warmer than the open country. I find it is not warmer at night, and we no doubt owe much of our success in growing tender shrubs and plants to the way in

which the timber trees act as a screen, and break the force of the cold winds that sweep across the open country.

It may seem somewhat curious to speak of shelter when treating of Hardy Spring Flowers, but there is no doubt all the plants I am about to mention are perfectly hardy, because with two or three exceptions they passed through the severe winter of 1895 when the thermometer on the grass registered 40° F. of frost at Belvoir; that was a sufficient test as to hardiness for Great Britain, and it is true it killed a few plants for us, but I do not intend to mention those to-day. Although shelter is not strictly necessary for these plants, it is undoubtedly of great benefit when many of them are in flower: for instance, *Rhododendron Nobleanum*, *R. Falconeri*, *R. praecox*, and others of the early flowering class. Camellias, and other shrubs that flower early in the year, if they are under the shelter of tall forest trees will often escape destruction of their flowers by frost. We are able to grow Neapolitan Violets under the boughs of a Cedar of Lebanon, where they flower throughout the winter, because they have a thick shelter overhead. So it will be found that shelter, whether from forest trees or the formation of the ground, or both combined, is a great advantage in growing these early flowers. On the other hand, it is not absolutely necessary; they will thrive on a site that is comparatively level and open; but it is possible they may not flower quite so early in those circumstances.

It is not often one has the opportunity of forming a new garden, but if I were doing so I would plant quick-growing forest trees around it, such as the Canadian Poplar; amongst them I would put others of slower growth that would eventually take the place of the Poplars. The kind would depend chiefly on the character of the soil; some tall-growing evergreens such as the Austrian Pine would be mixed among them for giving shelter in winter; and in front of these in irregular lines some dwarfer-growing evergreens would be placed, to keep out the cold wind near the ground, after the trees grew up. One of the finest shrubs for shelter is the Portugal Laurel, it proves very hardy in all kinds of places in the woods at Belvoir; another is *Rhododendron ponticum*, which is closer-growing than many of the hybrid kinds. Rhododendrons have a great advantage over other shrubs because rabbits will not eat them; in the severe winter of 1895 hundreds of these animals were killed at Belvoir through eating the Yew trees, but they did not touch the Rhododendrons that were growing close at hand.

This brings me to another subject, that of the soil, because it is well known that Rhododendrons and many so called "American" plants will not succeed where lime abounds in the soil. We are very fortunate in that respect at Belvoir, the geological formation being the Middle Lias system; this gives us a great depth of strong clay in the valleys and the lower parts of the hillsides, and a few feet of nice sandy loam, overlying ironstone, on the tops of the hills; in either of these soils Rhododendrons thrive to perfection, and we are able to

grow them freely without much attention after they are planted; it is quite possible to grow them where limestone abounds by making large beds of peat for them, but means must be taken to prevent percolation of water from the surrounding soil; apart from the expense of preparation, further operations will be necessary in a few years, when the peat beds become full of roots and exhausted. Mr. E. H. WILSON, to whose travels we are indebted for so many new plants from Western China, has sent us one or two small Rhododendrons which are said to flourish in a limy soil; perhaps by the aid of the hybridist we may eventually obtain a class of large flowering varieties that will be able to resist lime.

I place the Rhododendron at the head of the list of Spring Flowering Shrubs because it covers such a long season when in flower, and has such great variety of form and colour. We commence with the crimson form of *R. Nobleanum*, which usually gives us a few trusses of bloom in December; last winter it came much earlier than I have known before, and was in full flower on Christmas Day, huge bushes—many of them 6 or 8 feet high—were covered with crimson flowers. The next kind to open is *R. altaclerense*, a stronger-growing plant and deeper in colour. This does not come into full flower usually before March; *R. praecox* and the hybrid from it known as 'Early Gem' come about the same time. They are both of a mauve colour, and are very telling when in flower after they reach a fair size. Some of the Himalayan forms flower very early. *R. niveum* is one of the first. *R. campanulatum* is also early; its flowers vary in colour from white to mauve, and it is a magnificent plant when in bloom, growing very freely after it gets established. Some of the plants at Belvoir are 18 feet high. The foliage is large, and of a fine brown colour on the underside. There are many of these Himalayan kinds which are probably hardy in sheltered positions. Besides those mentioned above we have large plants of *R. Wallichii*, *R. Falconeri*, and *R. Thomsonii*. The last is a magnificent thing with round glaucous leaves and very dark crimson flowers, quite distinct from the ordinary Rhododendron in every way. Many others are on trial and some of them have passed through several winters safely; the great point when planting is to get good strong plants from the open ground, and always to plant in spring before growth commences: they will then have the summer months to make new growth and get acclimatized. I believe many fail with these Himalayan kinds because they put out poor little plants that have only lately left the propagating frame. That is not a fair test for them; they will require attention during the first summer if hot, dry weather comes, and if severe frost threatens to come in the winter months the roots should be mulched with half-decayed leaves, and some laurel boughs be placed round the plants for a few weeks.

The hybrid varieties of Rhododendrons are almost innumerable. When planting it is better to select a few distinct kinds rather than to purchase a general mixture. Some of the best are *R. Blandianum*,

R. Broughtonianum, *R. concessum*, *R.* 'Cynthia,' *R.* 'Doncaster,' *R. Everestianum*, *R. fastuosum flore pleno*, *R.* 'Helen Waterer,' *R.* 'Kate Waterer,' *R.* 'Lady Eleanor Cathcart,' *R.* 'Marchioness of Lansdowne,' *R.* 'Mrs. Holford,' *R.* 'Pink Pearl,' *R.* 'Sappho,' *R.* 'The Queen,' and the early varieties previously mentioned.

Next to the Rhododendron comes the hardy Azalea, which the botanists tell us ought to be called Rhododendron also; the earliest is the old sweet-scented yellow *A. pontica*. This is followed closely by *A. mollis*, and the hybrid varieties, all of which are worth growing. They give a range of colour from white to red, with many mixtures and intermediate shades. I will mention a few of the best which ought to be in every collection: *Altaclerensis*, 'Bouquet de Flore,' *coccinea speciosa*, *Daviesii*, 'Anthony Koster,' 'J. C. Van Thol,' 'Madame A. Koster,' 'Aida,' and 'Norma.' I find *Azalea amoena*—which is one of the species and often grown in greenhouses—is quite hardy at Belvoir, and looks very beautiful when in bloom if surrounded by the green grass. Another species—*A. occidentalis*—ought to be planted freely as it is the latest of all in flowering; these are all slower in growth than the Rhododendrons, especially during the first few years, but require similar soil and cultivation. I have dwelt rather long on Rhododendrons and Azaleas because they are the finest shrubs we have for giving colour in the garden, and are worth every care and attention in order to grow them well.

Other early-flowering shrubs are *Magnolia Soulangeana*, *Forsythia suspensa*, *F. hybrida*, *Prunus triloba flore pleno*, *Cydonia japonica* and its varieties, *C. Maulei*, *Amygdalus nana*, *Berberis Darwinii*, *B. stenophylla*, *B. japonica*, *Cerasus Pseudocerasus*, *Cytisus albus*, *C. Andreanus*, *Daphne Mezereum* *D. pontica*, *Deutzia gracilis*, *D. scabra flore pleno*, Tree Paeonies in many varieties, *Philadelphus grandiflorus*, *P. Gordonianus*, *P.* 'Voie lactée,' *Pyrus floribunda atrosanguinea*, *P. Scheideckeri*, *Ribes sanguineum* in various colours, *Spiraea Thunbergii*, *S. arguta*, *S. prunifolia flore pleno*, *Styrax japonica*, all varieties of Lilac both single and double, *Embothrium coccineum*, *Andromeda ovalifolia*, *A. floribunda*, *A. japonica*, *Erica stricta*, *E. arborea*, *E. carnea* and its white variety, *Azara microphylla*, Camellias in variety, *Viburnum plicatum*, *Diervilla rosea* and its varieties. Three climbing plants must also be included: *Wistaria sinensis*, *Clematis montana*, and *C. montana rubens*. These can be trained on poles or loosely over trees and bushes. There are other spring flowering shrubs which have not proved hardy at Belvoir but are quite safe in the neighbourhood of London, and in places farther south; for instance, the beautiful varieties of *Amygdalus* which make such a fine display at Kew, and most of the genera mentioned above have other varieties and sub-varieties which are worthy of cultivation where space permits.

The taller-growing plants in the above list should be kept mainly at the outer portion of the garden, leaving the dwarfer kinds, such as Azaleas, Heaths, and Tree Paeonies, to occupy the centre; but the

question of the heights of the various subjects and their disposition in the garden requires treating at greater length than is possible here.

In addition to shrubs there is a large number of smaller plants which add immensely to the display of the Spring Garden. These must be grown in borders where their cultivation will not interfere with the other occupants. Many trees and shrubs object to their roots being disturbed, especially Azaleas, Rhododendrons, Ericas and other fine-rooting plants. Beds or borders are therefore necessary, and especially so in soils such as we have at Belvoir. We find shrubs of all the kinds mentioned above will grow in the natural clay, if a little old potting soil, or leaf mould, is mixed in, around, and below them when they are planted. That is not the case with the smaller plants; for all those some beds of good soil are necessary, in spite of all the outcry against flower beds, which in many instances has been carried to a ridiculous excess.

It is not necessary to form a geometrical pattern. Beds of simple shape are always the most satisfactory for planting. Straight lines should be avoided unless they are close to the mansion; curved lines correspond best with the forms of leaves and flowers, and are best suited to a garden in every way.

On sloping banks a nice feature may often be made by levelling a piece from 4 to 6 feet wide and supporting it by dwarf walls of 2 feet in height, built of rough stones without mortar; these walls can eventually be clothed with dwarf-growing plants such as *Aubrietia*, *Cerastium*, and others of that kind, to remain permanently. The level portions at the top of the walls can be replanted annually or oftener if desired. A series of these small terraces at Belvoir looks very pretty when in full flower; they run side by side, of varying width, and therefore vary in outline, and a walk runs by their side both above and below.

Other beds are useful for many of the small plants, especially if they can be distributed in various parts of the garden, because many of the best among the early flowers object to being disturbed for a few years after planting; such, for instance, as *Chionodoxa Luciliae* or *C. sardensis*, *Anemone blanda*, *Anemone angulosa*, or, as it used to be called, *Hepatica*, *Anemone fulgens*, and others, a list of which will be found at the end of this paper. They must be seen in a dense mass to get the full beauty of them, and are quite worthy of a place to suit their requirements. A few annuals can easily be placed among them after they finish flowering, in order to prevent an untidy appearance in the summer, but nothing should be allowed to grow into a thick mass over them. Several of these plants give us the earliest flowers we get. *Anemone blanda* usually commences in December; it is sometimes a little difficult to cultivate I am told. I think one reason for this is probably due to the fact that a fungus attacks the roots while they are at rest; for that reason I always lift the roots after the second year of flowering, break them in pieces, and dry

them. Early in August they are replanted on a fresh piece of ground that has been manured and got ready some few weeks before. Some of the varieties of *A. blanda* are very beautiful, especially *A. cypriana* and *A. scythinica*. All these early Anemones last in flower a long time as they have the habit of closing their flowers when cold wind or rain comes. They seed very freely, and if not collected the seedlings spring up all round. Unfortunately they do not come true to colour, and this leads some growers to fancy the colour of the old roots deteriorates. *A. apennina* flowers later, and is quite distinct in the form of root and its seeding from *A. blanda*, although botanists class *A. blanda* as a variety of *A. apennina*. *A. fulgens* requires the same treatment as *A. blanda*, and is a magnificent plant where it does well. It increases very freely with me under the above treatment, and flowers early. Sometimes a good handful can be gathered in January. The variety *A. graeca* does not succeed well at Belvoir. It is dwarfer and of a more intense colour, almost a real scarlet. Another Anemone succeeds these and is very useful where it does well. This is a double variety of *A. hortensis* called 'King of Scarlets.' Another plant that seeds and sows itself freely is the Winter Aconite (*Eranthis hyemalis*), not a very showy flower it is true, but one of the best for naturalizing under deciduous trees. It soon establishes itself and will thrive without further attention. I find it is liable to be thinned by pheasants eating the roots in summer, after the leaves die away. It usually commences flowering in the first week of January. This season it opened its first flowers on November 24. I have never seen it open in November before. The larger variety, called *E. cilicica*, is not so effective as the old kind. Irregular patches of Snowdrops may be arranged among the Aconites, they will extend the season of flowers after the Aconites are over. *Anemone apennina* would also succeed if the shade was not too dense overhead.

Another plant that dislikes frequent removal is *Gentiana acaulis*. More people complain to me of failures to grow this plant than any other hardy plant that I have mentioned. I believe the chief cause of failure is owing to frost pushing the roots out of the ground. I always make it a rule to tread it well all over as soon as the hard frosts have ceased, and find no difficulty in getting abundance of flowers. The best time for replanting is soon after the flowering is over. It is best to pull the shoots apart and put them in singly in broad rows, with the pieces about an inch apart each way; we usually make the rows about 9 inches wide, as an edging to other things. They grow into a thick mat in a year or two. This plant likes a moist position, and will grow either in full sunshine or where it is shaded during some part of the day. There is a sky-blue variety, but it is very scarce, and I have never been able to obtain it.

Chionodoxa is another group of early-flowering plants that succeed best if left for several years in the same place. They throw much stronger spikes and larger flowers after being well established, and the border around the plants becomes full of young seedlings, which

flower the second year and soon make a very thick mass; this refers more especially to *C. Luciliae*, which I think is the best of all. *C. sardensis* has flowers of a deeper blue; *C. Allenii* and *C. grandiflora* are much larger, but do not grow so freely. I have a pure white seedling from *C. Luciliae* which I believe has also appeared in other collections. *Iris pumila* is another gem which does not like to be disturbed. It flowers in March and is only about 4 inches high. I grow three varieties: *bicolor*, which is grey and blue, *concolor*, which is sky-blue, and a dark-purple form. Many varieties are often sold as *I. pumila* which grow 18 inches high and are not genuine. It is rather apt to die away in some places, I am told. I find the best time to plant it is when the flowers are dying away, then to leave it in the same place until it shows signs of failing health. *Muscari conicum* 'Heavenly Blue,' compared with some of the preceding, may be called a recent addition to our hardy flowers, and has been used more frequently for pot culture. I find it very useful in the flower-garden, for it gives a fine mass of blue flowers after it gets established, and increases very freely. No special treatment is necessary.

The varieties of Narcissus contain some of our best spring flowering plants. They have the great merit of standing bad weather well. I have often seen broad rows of them 500 feet long lying flat on the ground on a frosty morning, and, in three hours they have all been standing up again us usual. As it is necessary to plant them early in the autumn (or in August if possible) they cannot be used like Tulips and Hyacinths in the ordinary flower-beds if one wishes to grow them to perfection. The strong-growing varieties do well—where the natural style of gardening is followed—if they are dotted about the grass in irregular patches or clumps; some plant them in very large breadths about one foot apart. I consider this plan a mistake; it does not correspond with Nature's way; they should be put in thickly and then two or three yards be left vacant for the grass to grow. In our strong clay at Belvoir they may be left for twenty years without attention; in lighter soils they would deteriorate in less time and require removing to "fresh woods and pastures new." The varieties are now so numerous it is not easy to make a selection, but it is best to put the strong-growing varieties in the grass, such as *N. obvallaris*, *N. Telamonius*, *N.* 'Emperor,' *N.* 'Empress,' *N. concolor* 'Autocrat,' *N. princeps*, *N.* 'P. R. Barr,' *N. major*, *N.* 'Sir Watkin,' and *N.* 'Frank Miles.' These all do well at Belvoir. One of the newer varieties, called 'Lucifer,' is a very telling thing at a distance, and is now getting cheaper. I am not sure if its constitution is as good as the varieties mentioned above. The weak-growing kinds such as *N. Johnstonii*, *N. triandrus*, *N. cyclamineus*, and others, should be planted where their various requirements can be attended to, and not be trusted among the grass.

Primula japonica is a very imposing object if a good mass of it is planted. A moist position should be chosen for it, because it will do

better there if a dry period comes in summer. The finest plants I have seen were growing in Colonel HOPE's garden on the banks of the Leader. A few plants of the light-coloured varieties should be mixed with the original kind. It likes a soil containing plenty of humus in the form of peat or leaf-mould. The seeds germinate freely in such a position if allowed to ripen, and the bed soon becomes a mass of plants.

Scilla sibirica gives the best blue among all these early flowers, although the flower spike is not so graceful as that of *Chionodoxa Lucilliae*. The Scillas require similar treatment to Chionodoxas, but do not reproduce themselves so freely. *S. bifolia* is a very pretty flower which comes into bloom before *S. sibirica*. It has white and pink varieties.

Another class of plants consists of those which are used for filling the flower-beds after the summer occupants are cleared away, about the middle of October. The beds are got ready a few days before planting commences. As they are usually in a dry state when dug they are left until rain comes to moisten them, and are then filled up again as soon as possible.

The bulbous plants used comprise Tulips, Hyacinths, and a few Crown Imperials. Crocuses of the Dutch varieties may be grown where game is not troublesome ; pheasants are very fond of them in early spring, and often damage the carpeting plants when they are digging up the bulbs. The same remarks apply to Tulips, but in a lesser degree, as they usually attack them later in the season, just as they are opening their flowers. Hyacinths escape better ; few things care to eat them. Probably they contain some poisonous property which protects them. Lists of the varieties used are given at the end of the paper, and many others have been tried and have been discarded for various reasons.

I said at the commencement I consider there is room for much improvement in our treatment of these spring flowers. In one especial manner this is true, viz. in their arrangement. We often see in London and other places beds crammed full of Hyacinths, Tulips, or Narcissi. These make a solid mass of colour when in flower, but the display only lasts a fortnight. I find it is possible to have some flowers whenever the weather is mild by using a greater variety of plants. Aubrietias, Daisies, Violas, and many others are used for covering the surface ; the Tulips and Hyacinths are dotted in among them after they are planted, and are put about 18 inches apart. Thus we get a good display of flowers from the beginning of April until the end of May ; in addition to that the effect is so very much better, we get a greater variety of colours in combination, and the Tulips look so much more graceful when growing a moderate distance apart, and above other flowers. Hyacinths look rather stiff whichever way they are arranged. I often group them three together in a triangle, where a line is wanted, and then leave a good space, which of course is carpeted with other plants. A great point in favour of these small

spring flowering plants is the fact that they are usually softer in colour that the ordinary summer bedding plants, and blend together better ; there is not so much danger of producing harsh contrasts. Although in the Aubrietias, Myosotis, and Violas we get various shades of blue which require much care in grouping and are often better if kept a good distance apart, fortunately there are many flowers of neutral tints which can be arranged between them.

It is a good plan if the beds are large to use a few dot plants among the Wallflowers and other tall growers to lighten the arrangement after the Tulips have finished flowering. Such things as *Carex riparia variegata*, variegated Honesty, variegated Crown Imperial, *Hemerocallis fulva variegata*, *Iris foetidissima variegata*, *Phalaris arundinacea variegata*, *P. a. elegans*, *Scrophularia Scorodonia variegata*, and *Symphytum officinale variegatum* are used for that purpose.

The number of varieties used in one bed must depend largely on the size. As a rule the bands of colour should not be less than one foot wide, and of course a large group of one colour should occupy the centre of isolated beds. In order to carry out the arrangements properly on the lines recommended above it is necessary to have a reserve garden for propagating and growing the plants through the summer. This should be in a moist situation, some of it shaded through the hottest part of the day, with a good working soil. We are fortunate at Belvoir in having a large kitchen garden, part of which can be spared for the purpose, but that would not be possible in many places. Propagation must begin early in the year for some plants, especially the Aubrietias, as these should not be transplanted or pulled to pieces between the middle of April and the middle of October. If done between those dates they require the greatest care to keep them alive. I therefore keep a reserve stock for propagating from, and commence as soon as severe frost is over, usually about the beginning of March. Small pieces of Aubrietia with roots are carefully planted, and make good plants 6 inches and upwards in diameter by the time they are wanted for planting in the autumn. The same remarks apply to *Arabis*, *Alyssum*, *Carex*, Daisy, *Festuca*, *Holcus*, *Phalaris*, *Phlox* 'Newry Seedling,' *Phlox amoena*, *Phlox subulata* and its varieties, *Saxifraga* (all kinds in the list), *Viola*, Violets, and *Waldsteinia*. They may all be increased by division at the beginning of March and will make good plants for planting out in the following autumn, but none of them are so particular about the date as the Aubrietias—in fact all the others will usually succeed if done when the beds are cleared in May. That is the time, however, when I generally secure my stock for propagating from the following spring. It saves labour considerably if it is done early. The Aubrietias, as I have said previously, are very difficult to move after the middle of April. They are planted as quickly as possible on a moist, shady border, and receive every attention in order to keep them alive, but after all is done they will turn brown like

a lot of dry hay. After a time they start again into fresh growth, and are then safe.

Many of the plants are raised from seeds. These include Daisies (all varieties except 'Alice') sown in June, *Erysimum* sown in June; Golden Feather in July; Honesty in May; Myosotis in June; Polyanthus in February; Primrose in February; Stocks in June; Wallflowers, 'Phoenix' and 'Earliest of All,' sown in May; other varieties in June. These will all require good cultivation and attention when put out in the reserve garden in order to have them strong for flowering in the following spring. We watch for showery weather when about to plant them in the garden for the summer. This is especially necessary with the small seedling Polyanthus plants and Primroses. They are put on a north border in May, and make fine large plants in the following autumn. Many persons can grow them by division of the roots after flowering is over. This plan cannot be relied upon at Belvoir because we usually get a very dry air in July and August, and a fortnight of that is fatal to them. The same reason prevents us growing the double varieties of Primrose and a few other things which I have not mentioned. Tulips are preserved carefully when the beds are cleared in May, and are planted in the ground again for a time until the tops die away. Some experiments which I carried out a few years since proved that the worst time for moving Tulips was about a month after flowering was over. Some lifted when in full flower increased much faster than the others, as they continued growing and formed new bulbs better and stronger. We grow two sets at Belvoir. Those in the beds this year will go to the reserve garden when lifted; after they die off they are dried and cleaned. In the autumn they are planted in a plot that has previously been got ready for them. They flower there next year and any mixed ones are put right; then after drying and cleaning they are used for the beds again. We find some varieties increase very quickly and a large stock is soon obtained. Others have to be replenished from the nurserymen occasionally; but this plan of growing them reduces the expense very much, and no one need be deterred from using them if they take care of them.

Hyacinths are not so easily managed, but those who have sandy soils would be more successful with them than I have been. They do not mature well after they are taken from the beds, and eventually get very weak or disappear altogether. We are never able to use them again in the beds; they furnish flowers for cutting for room decoration.

Three plants have been mentioned which did not survive the severe winter of 1895–96. *Embothrium coccineum*, which was not planted until 1908, it is now 6 feet high but has not yet flowered; Stocks, which are not hardy, they are always wintered in cold frames and planted out in March; and *Philadelphus* 'Voie Lactée,' a new variety which has only been a short time in the collection.

Please substitute this leaf for the corresponding one in Part I., August 1913.

Plants that remain several years without removal.

Aconite (*Eranthis hyemalis*).
Anemone blanda in variety.
A. fulgens in variety.
A. Hepatica in variety.
A. hortensis 'King of Scarlets.'
A. nemorosa Robinsoniana.
Chionodoxa in variety.
Corydalis cava albiflora.
Crocus Imperati.
Gentiana acaulis.
Helleborus, 'Lent Rose,' in variety.
Helleborus niger.
Iris pumila in variety.
I. reticulata.
Lily of the Valley.
Muscari conicum, 'Heavenly Blue.'
Narcissus, many varieties.
Primula cortusoides.
P. japonica
Puschkinia scillioides
Scilla bifolia.
S. sibirica.
Tulipa Griegii.
T. Kaufmanniana
Triteleia uniflora.
T. uniflora violacea.

Plants used for Spring Bedding.

Alyssum saxatile nanum.
Arabis albida.
A. albida flore pleno.
Aubrietia 'Fire King.'
A. graeca.
A. graeca, selected blue.
A. graeca variegata.
A. Hendersonii.
A. 'Lavender.'
A. Leichtlinii.
A. Moerheimii.
Auricula, alpine varieties.
Carex riparia variegata.
Crown Imperial, variegated.
Daisy 'Alice.'
,, double pink.
,, double white.
,, 'Firefly,' crimson.
Doronicum austriacum.
D. excelsum.
Erysimum compactum.
Festuca glauca.
Golden Feather (*Pyrethrum*).
Heath (*Erica carnea*).
Helleborus foetidus.
Hemerocallis fulva variegata.
Heuchera hispida.
Holcus mollis variegatus.
Honesty, variegated.
Iris foetidissima variegata.
Luzula campestris.
Myosotis alpestris 'Queen Victoria.'
M. alpestris 'Royal Blue.'
M. dissitiflora.
M. dissitiflora alba.
M. dissitiflora Dyerae.
M. 'Ruth Fischer.'
Onopordon Acanthium.
Phalaris arundinacea variegata.
P. arundinacea elegans.
Phlox amoena.
P. divaricata.
P. 'Newry Seedling.'
P. subulata 'Brightness.'
P. subulata Nelsonii.
P. subulata 'Sprite.'
P. subulata 'Vivid.'
Polyanthus, mixed colours.
P. 'Veitch's White.'
P. 'Veitch's Yellow.'
Primrose 'Wilson's Blue.'
Saxifraga Bathoniensis.
S. Camposii (*Wallacei*).
S. Clibranii.
S. cordifolia purpurea.
S. 'Guildford Seedling.'
S. ligulata.
S. moschata atropurpurea.

Plants used for Spring Bedding—*continued.*

S. purpurascens.
S. Rhei.
Stock 'Empress Elizabeth.'
Symphytum officinale variegatum.
Viola 'Admiration.'
,, 'Agnes Barr.'
,, 'Belvoir Castle White.'
,, 'Blue King.'
,, 'Bullion.'
,, 'Cliveden Purple.'
,, 'Countess of Kintore.'
,, 'John Quarton.'
,, 'Lord Elcho.'
,, 'Maggie Mott.'
,, 'Meteor.'
Viola 'Robinson's Standard.'
,, 'Skylark.'
Violet single 'Russian.'
,, double 'Lady H. Campbell.'
Waldsteinia trifolia.
Wallflower, 'Belvoir Castle.'
,, 'Earliest of All.'
,, 'Dark Red.'
,, 'Double German.'
,, 'Sutton's Phœnix.'
,, 'Veitch's Ruby Gem.'
,, 'Veitch's Salmon.'
,, 'Queen.'

Bulbs used for Spring Bedding.

Hyacinths.

'Gigantea,' pink.
'La Grandesse,' white.
'La Pérouse,' pale blue.
'Robert Steiger,' red.

Tulips.

'Cerise Gris de Lin.'
'Chrysolora.'
* 'Clara Butt.'
'Cottage Maid.'
'Couleur Cardinal.'
'Duchesse de Parma.'
'Elegans.'
* 'Fairy Queen.'
* *Gesneriana rosea.*
* *Gesneriana spathulata.*
* 'Golden Crown.'
* 'Isabella.'
'Keizerskroon.'
* 'La Merveille.'
* 'Loveliness.'
* 'Margaret.'
* 'Mr. Farncombe Sanders.'
* 'Picotee.'
* 'Prince of Austria.'
'Proserpine.'
* 'Retroflexa.'
* 'Summer Beauty.'
'Vermilion Brilliant.'
'White Swan.'

Double varieties.

'Le Candeur.'
'Murillo.'

* May-flowering varieties.

THE LITERATURE OF THE ROSE.

By Arthur William Paul, F.R.H.S., of Waltham Cross.

[Read April 1, 1913; Mr. G. Gordon, V.M.H., in the Chair.]

Viewed in its widest sense the literature of the Rose may be said to have its origin in very remote times. Wherever the flower grew and flourished it appears to have compelled the admiration alike of the artist, the poet, and the student of natural history, so that we are confronted with a large number of allusions to it in the writings that have come down to us from ancient Greece and Rome as well as in those that have survived from the Middle Ages. With these however I do not propose to trouble you, especially as we shall have occasion to notice more than one work of modern times dealing exhaustively with this particular phase of rose-lore, and I think it will be amply sufficient if we commence our researches at the period when, with the general revival of learning, botany and horticulture began to take a more prominent position among the sciences and arts of the world. Even with this limitation so abundant are the materials at our disposal that it will not be possible to do more than take a cursory glance at them within the time at our disposal, but with your permission I shall have the pleasure of directing your attention to what appear to me the most important and interesting of them. As a guide to works on the subject that had appeared up to the commencement of the nineteenth century an excellent bibliography of the Rose by the French botanist Thory, dated 1818, will be found affixed to the first volume of the folio edition of Redouté's *Les Roses*, and since that time a less comprehensive attempt has been made by a Spanish author and published in Madrid in 1892,* but a complete and up-to-date bibliography is still a desideratum.

The first monograph of the Rose which I can find recorded was written in Latin by Nicolas Monardes, a physician of Seville, and printed in Antwerp about the middle of the sixteenth century. It is entitled *De rosa et partibus ejus* and was included in the author's work *De secanda vena in pleuritide*. I have not seen the original edition, but it was reprinted in Clusius' *Exoticorum*, published in Antwerp in 1605, and in this form is easily obtainable by the curious; it deals largely with the medical and economic uses of the Rose.

Taking Monardes' work as our starting-point, I propose to divide the subject into three periods or epochs: the first includes two hundred years, from the middle of the sixteenth to the middle of the eighteenth century; the second includes the succeeding hundred years to the middle of the nineteenth century; and the third period comprises the latter half of the nineteenth century and continues up to the present time.

* *Bibliografía de la Rosa*, por D. Mariano Vergara.

FIRST PERIOD.

During the first period, that is from the middle of the sixteenth to the middle of the eighteenth century, it will be found that in comparison with the subsequent periods the literature of the Rose is scanty, and such works as appeared have now become principally of antiquarian and historical interest; but notwithstanding this I think it will be quite worth while to glance at the more important of them. Gerarde's *Herbal* (1597 and 1633), Swerte's *Florilegium* (1612), the *Hortus Floridus* of Passaeus (1614), and Parkinson's *Paradisi in Sole* and *Theatrum Botanicum* all contain references to the Rose, with figures of many species and varieties that were in cultivation at those periods; but the finest illustrations of these old-time Roses are those of the *Hortus Eystettensis* (1613), in which brilliant impressions are given of twenty-one kinds. A really remarkable work also which appeared during the first half of the seventeenth century is Rosenberg's *Rhodologia*, the first and second editions of which are dated respectively 1620 and 1626, whilst the corrected and improved third edition of 400 closely printed pages, with a portrait of the author, is dated 1631. It is written in Latin and is described on the title-page as a philosophical-medical description of the Rose. The preface alludes to the Rose as "Florum princeps"; the first part of the book, consisting of two pages, is termed "philological" and deals with references to the Rose in the writings of sacred and profane authors from the earliest times. The second part, of 250 pages, is devoted to an historical account of the Rose and particulars concerning its medical properties and economic uses. Chapter VI contains a list with descriptions of the different kinds of Roses known to the author, some thirty-seven in number, arranged in two divisions. The amount of research and labour involved in the production of the *Rhodologia* must have been enormous and such as to entitle the author to the respect and gratitude of everyone interested in the philology and historical literature of the Rose. A tribute to its value will be found in the introduction to Redouté's great work on the Rose.

The *Historia Plantarum* of John Bauhin, assisted by Cherler and Cherler, published in 1651, contains in the second volume a long and interesting chapter on Roses, with figures of many of the kinds described; and in 1681 a small and curious volume entitled *Cynographia* appeared at Jena. It was written by a Dr. Hagendorn and deals with the many uses of the Dog-Rose in medicine and domestic economy. From this we learn that all the parts of the plant and flower were held under contribution, and directions are given for preparing a medical liquor and spirit from even the larvæ of the gall-fly which produces and inhabits the mossy growths known as "bedeguars" which are often found on the shoots of the Dog-Rose. Of English authors of the same period, Ray, in his *Flora*, 2nd edition, 1677, devotes his fourth chapter to the Roses growing in English gardens in his time. Thirty species or varieties are described, the chapter

concluding with cultural notes on the genus. The descriptions of the *Rosa Mundi*, the York and Lancaster Rose, and the Double Yellow Rose (*R. sulphurea* or *hemispherica*) are especially accurate. GILBERT's *Florist's Vade Mecum* and *Gardener's Almanack* (1683), quoted in WESTON's *Tracts* and elsewhere as containing good descriptions of the Rose of his day, reproduces REA's list and descriptions of varieties with the cultural directions slightly varied and amplified. In the first half of the eighteenth century PETIVER figured Roses in his *Gazophylacium*, as did also FURBER in his *Flower Garden Described*, and the authors of the *Hortus Anglus*, or *Catalogue of Trees and Shrubs*, which appeared in 1730. DILLENIUS, in his *Hortus Elthamensis*, describes and figures three interesting kinds, and both BLACKWELL and SHELDRAKE figure in their *Herbals* the kinds employed in medicine in their day. The first edition of MILLER's *Gardeners' Dictionary* (1731) contains an article on the Rose describing forty-six species, which however are reduced in the eighth edition (1768), which was the last published in the author's lifetime, to twenty-two, the remainder being considered to be varieties only. The sumptuous German works of WEINMANN, TREW, and KNORR (1737 and onwards) also include coloured illustrations of Roses of interest, but it is to be regretted that the great flower painter of that period, EHRET, did not devote more of his time and attention to the Rose, as the few specimens of his Rose drawings which we have in the *Hortus nitidissimus* and elsewhere are certainly striking; some two or three of his original drawings were exhibited at the Rose Conference of this Society in 1889.

SECOND PERIOD.

With the appearance of HERRMANN's treatise *De Rosa*, printed in Strasburg in 1762, and D'ORBESSAN's essay, printed in Paris in 1768, we arrive at the second period or epoch of our subject, and I think this will be found of extreme interest, as having produced works that are still in some instances unrivalled, and in many more have laid the foundation of the Rose literature of the present day. Whilst the medical and economic uses of the plant and flower began to lose some of their importance, the number and beauty of the wild forms of the Rose and their wide distribution over the Northern Hemisphere were rendering it of increasing interest to the botanist, and the grace and elegance of the ever-increasing number of garden forms brought it into greater prominence as an object of ornamental culture. A large number of botanical works and treatises appeared classifying and describing the various wild Roses and their different forms; France and Germany vied with this country in the production of splendid iconographies portraying both wild and garden Roses; many cultural works were issued for the guidance of those desirous of having beautiful Roses in their gardens, and towards its close a periodical literature began to spring up in the botanical and horticultural journals of the day.

Turning first to the botany of the Rose, in addition to HERRMANN already mentioned, some eminent names during the period under review are AFZELIUS, DE CANDOLLE, DE PRONVILLE, DUMONT DE COURSET, EHRHART, JUSSIEU, LEMAN, RAU, SELBSTHERR, Sir JAMES SMITH, THORY, TRATINNICK, WALLROTH, WOODS, and of course LINNAEUS; but it was especially Dr. JOHN LINDLEY who sifted and crystallized the efforts of his predecessors and contemporaries to give us the result of his labours in his imperishable *Rosarum Monographia*, published in 1820, a work which will remain for all time a standard authority on the botany of the Rose. The tangled mass of species and varieties that had arisen during the preceding century or longer are here reduced to their true proportions, and their sequence and relations to one another are rendered intelligible to the most casual student of the genus.

Whilst the botany of the Rose was thus engaging so much attention, its value as a garden flower was by no means neglected, and several important works devoted to illustrating in colour the different species and varieties from the standpoint of their beauty as decorative objects in the garden appeared. Of these the first in date of appearance was the work of Miss LAWRANCE entitled *A Collection of Roses from Nature*, consisting of representations of ninety different kinds of garden Roses painted between the years 1796 and 1799, and published in London in the latter year. Both the drawing and colouring of the flowers are excellent, and the delicacy and vividness of their tints remain unimpaired in all the copies of the book that I have seen. Exception has been taken to the botanical accuracy of the foliage in some of the plates by reason of too great uniformity in the drawing and colouring, but taken as a whole the work is one of great magnificence and compels our admiration on its merits as well as our gratitude, if only on account of its having, partly at least, inspired REDOUTÉ to undertake his larger work. Miss LAWRANCE'S book has become scarce and commands a high price; it is usually found in small folio size, although copies on larger paper are in existence; the plates are preceded by a handsome frontispiece depicting a wreath or garland of Roses of various colours and a dedication to the Queen; the text is insignificant, consisting only of four pages of botanical arrangement, which now have little value, at the end of the book.

Following Miss LAWRANCE'S illustrations at a short interval as regards time, but at a great distance in respect to the beauty of the drawings, came Dr. RÖSSIG'S *Die Rosen*, published in parts at Leipsic in the year 1802 and onwards. The author's intention appears to have been to illustrate 100 or more varieties of garden Roses, but after the appearance of the fiftieth plate the work stopped, to be continued later by another hand, but the continuation extended only to ten more plates, making sixty in all. A short description in German and French accompanies each plate, and there is also an introduction in both languages, in which Miss LAWRANCE'S work is freely criticized. RÖSSIG'S *Rosen* is of bibliographical interest as furnishing a link in

the chain of the literature of the Rose, and from his lesser known descriptive work in German, published in two volumes in 1799 and 1803,* it is evident that his knowledge of Roses and their varieties was considerable.

In 1805 appeared the first part of *Roses, or a Monograph of the Genus Rosa*, by H. C. ANDREWS, a work which from the time of its inception to its completion in 1828 illustrated upwards of 100 species and varieties of Roses, a short description accompanying each plate. If we cannot give the same unreserved praise to these drawings that we can afford to the illustrations of Heaths and other flowers of the same artist, ANDREWS' Monograph will always rank as a valuable and interesting contribution to the literature of the Rose, giving more or less faithful representations of many of the older kinds of Roses not met with elsewhere.

Following on the rising interest in the Rose manifested in England, Germany, and Holland, but perhaps even more as the result of the direct influence of the Empress JOSEPHINE, who cultivated a large collection in her garden at Malmaison, the cultivation of the Rose in France began to make great strides in the opening years of the nineteenth century, and in 1817 appeared the first part of REDOUTÉ'S magnificent work *Les Roses*. This great artist, who has been termed "the Raphael of flowers," and whose facile pencil portrayed with equal fidelity and grace the humblest flower of the field and the choicest exotic of the greenhouse and stove, was a native of Belgian Luxemburg, and at the time of the appearance of *Les Roses* was the Court painter of flowers at Malmaison, the cost of the drawings and engravings of *Les Roses* being borne by the Empress.† In the 169 plates of species and garden varieties of Roses contained in the first, or folio edition, the artist has taken care to avoid all the errors and imperfections of his predecessors and has given us a series of illustrations of Roses that for botanical accuracy, elegance of composition, and beauty and faithfulness of colouring are beyond all criticism. He was fortunate in enlisting as his colleague C. A. THORY, who furnished, in addition to an introduction setting forth the motive and scope of the work, a copious explanatory text to accompany each plate, and also the bibliography at the end of the first volume, to which reference has already been made. The third volume of the first or folio edition of *Les Roses* is dated 1824, and in the same year a second edition commenced to appear in a smaller size (8vo), the plates being correspondingly reduced in size. In 1835 a third edition, also in 8vo size, was issued; this contains portraits of both REDOUTÉ and THORY, and is also enriched by a valuable introductory essay on the Rose by the latter author; the plates also are botanically grouped. In addition to the illustrations contained in *Les Roses*, other plates of Roses by REDOUTÉ are in existence, one of especial interest being

* *Oekonomisch-botanische Beschreibung der verschiedenen und vorzüglichen Arten Ab- und Spielarten der Rosen.*

† *Les Roses de l'Impératrice Joséphine*, par J. GRAVEREAUX. Paris, 1912.

the coloured representation of the Yellow China Rose, which is the original source of so many of the yellow-flowered varieties of the present day; this plate appears with others in the *Choix des plus belles Fleurs*, published at Paris in 1827.

As a further result of the stimulus given to Rose culture in France by the interest taken in this flower by the Empress JOSEPHINE may be mentioned the creation of several commercial establishments devoted either exclusively, or principally, to the culture of the Rose in its many phases, the raising of new varieties from seed being a special object of attainment, so much so indeed that we are informed on good authority that the 100 different kinds of Roses that were estimated to exist in gardens in 1800 had risen to 250 in 1815, to 2500 in 1828, and to 5000 in 1845. DU PONT, DESCEMET, DE VILMORIN, GUERRAPAIN, LAFFAY, HARDY, VIBERT, PRÉVOST, and NOISETTE are names that stand out in the history of the development of the Rose in France at this period, and several of these have left behind them valuable contributions to the literature of the flower in their catalogues or other publications. Especial mention may be made of GUERRAPAIN'S *Almanach des Roses*, published in 1811; VIBERT'S Essays and Catalogues, 1820 and onwards; and PRÉVOST'S Catalogues. VIBERT'S Essays will still well repay perusal, and, in the words of the late Lord PENZANCE, "show him to have been a man of a very intelligent and thoughtful mind, and indeed of no mean literary ability." * Certainly his prophetic forecast of the lines on which to work in order to obtain the best results in the raising of new varieties of Roses from seed has been amply fulfilled in these later days. Some other important works that appeared in France at this time are GUILLEMEAU'S *Histoire Naturelle de la Rose*. 1800; the Count LELIEUR'S *De la Culture du Rosier*, 1811; DESPORTES' *Rosetum Gallicum*, 1829; BOITARD'S *Manuel Complet de l'Amateur de Roses*, 1836; and LOISELEUR-DESLONGCHAMPS' *Recherches sur l'Histoire de la Rose*, 1844. Mention should also be here made of two historical works which appeared, the one in France and the other in England, viz. the Marquis DE CHESNEL'S *Histoire de la Rose chez les peuples de l'antiquité et chez les modernes*, published at Toulouse in 1820, and FALCONER'S essay on the *Ancient History of the Rose*, read before the Botanical Society of Edinburgh in 1838, and printed in Vol. XI of LOUDON'S *Gardeners' Magazine*; the former of these still ranks as a classic on the subject of which it treats.

To those interested in coloured representations of Roses of the period the plates by BESSA illustrating the article on the Rose by LOISELEUR-DESLONGCHAMPS in the seventh volume of the *Nouveau Duhamel* (1819) and the beautiful miniatures in MALO'S *Histoire des Roses* (1820) will prove interesting, as will also PACQUET'S work, *Centurie des plus belles Roses* (1845 and onwards), the plates of which, by ANNICA BRICOGNE and others, worthily illustrate the leading garden varieties in vogue at the time it was published.

In this country, following the appearance of ANDREWS' Monograph,

* *Modern Roses and Hybridisation*, in JOURNAL R.H.S., vol. xi.

there is little of importance to chronicle until RIVERS published in 1837 the first edition of his *Rose Amateur's Guide*, a work which formed an excellent handbook or guide to the varieties in cultivation at the time it was issued, and which contains much cultural information that will remain true for all time. From the high position occupied by its author as a practical horticulturist this work at once commanded the attention it deserved, and may be regarded as a pioneer of the modern type of handbook on the subject. Of more comprehensive scope and wider scientific design was *The Rose Garden*, by WM. PAUL, the first edition of which appeared in 1848. This work is arranged in two divisions, the first division including chapters on the History of the Rose, the Formation of the Rosarium, and the various practices of cultivation, including the principles of hybridization and cross-breeding with a view to the raising of new varieties from seed, whilst the second division embraces a natural arrangement of above 2000 varieties cultivated in gardens, accurately described from close personal observation. The coloured plates and illustrations in the text added much to the value of the book, the success of which at the time of its first appearance was phenomenal, translations speedily appearing in more than one European language. As a model of close reasoning applied to practice the cultural portion of *The Rose Garden* can never be superseded, whilst the descriptive portion has been revised and supplemented in subsequent editions in order to include the newer varieties of importance that are being yearly added to collections: the tenth edition of this book is now with us. Another interesting work that appeared about this time (1850 to 1853) is Curtis' *Beauties of the Roses*, consisting of thirty-six artistically executed coloured plates of garden varieties with descriptive notes.

THIRD PERIOD.

If we experience a difficulty in adequately mastering and systematizing the literature of the Rose that appeared during the second period of our review, this is still more the case in the third period, consisting of sixty years, from the middle of the nineteenth century to the present time. The rapid expansion that has taken place in the cultivation of the flower in all civilized countries, the introduction of several important species and the remarkable multiplication of garden varieties have been fully reflected in the mass of literature that has appeared on the subject, especially of late years, and of cultural works in particular we have a formidable and almost bewildering array. I trust therefore that I shall not be supposed to be wanting in appreciation of any individual efforts if the magnitude of the task renders it impossible for me to make specific mention of them all.

As authorities on the botany of the Rose during the time in question the names of T. MOORE, J. G. BAKER, DÉSÉGLISE, WOLLEY DOD, and VIVIAND-MOREL are familiar to us as a few out of many who have given us in writing the concrete results of their labours, and another name that will readily occur to us is that of the late accomplished

Director of the Botanic Garden at Brussels, FRANCOIS CRÉPIN, who between the years 1869 and 1882, in addition to many smaller essays, published his *Primitiae Monographiae Rosarum*; or materials for the history of the Rose, an epitome of which he presented to the Rose Conference of this Society in 1889 under the title of a *Sketch of a New Classification of Roses*. This was printed in volume xi of the Society's JOURNAL, and reappeared with certain modifications in the French *Journal des Roses* in 1891, from which it was reprinted in pamphlet form in the same year. We are aware of the difficulty of fixing any limits of finality in the botanical treatment of a subject like the Rose, but both in this country and on the Continent of Europe CRÉPIN'S work bids fair to hold for a long time its present position of importance. Any allusion to the present-day botany of the Rose would also be incomplete without a reference to the magnificent work of Miss WILLMOTT, *The Genus Rosa*, which has appeared within the last two years. The large number of excellent coloured plates, combined with the mass of botanical and cultural information furnished by the text accompanying them, render this without doubt the most valuable iconography of the Rose that has appeared since REDOUTÉ'S *Les Roses*, and although in a few instances we may regret to find new names in place of those to which we have become accustomed, no doubt the author considered that there were good reasons for the alterations.

Of historical works of the period the most important are JORET'S *La Rose dans l'antiquité et au moyen âge* (Paris, 1892), and BELMONT'S *Dictionnaire historique et artistique de la Rose* (Melun, 1896); the former author invests his subject with a lightness and charm which render the book delightful reading throughout, whilst Mr. BELMONT'S Dictionary is valuable as a work of reference. I should also like to mention a small work which appears to be little known, and which I think must have been printed in London about the middle of the last century. It is entitled *An Essay on the Mythological and Symbolical History of the Rose, from the German*, but neither author's nor translator's name is given, although no doubt they could be ascertained without great difficulty. This essay deals with the history, cultivation, and use of the Rose amongst the ancient Greeks and Romans, and the author has succeeded in collecting many facts and references which I do not remember to have seen elsewhere recorded.

From the many books that have issued from the press in this country during recent years having for their object the encouragement of the culture of the Rose in gardens, it would seem somewhat invidious to make a selection where nearly all have their special points of excellence. In point of priority the late Dean HOLE'S *Book about Roses*, the first edition of which was published in 1869, will come first, and of subsequent works that have obtained an extended circulation I may mention the Rev. A. FOSTER MELLIAR'S *Book of the Rose*, Miss JEKYLL'S and Mr. MAWLEY'S *Roses for English Gardens*, the Rev. J. H. PEMBERTON'S *Roses*, Miss KINGSLEY'S *Roses and Rose Growing*, and E. T. COOK'S *Rose Growing Made Easy*.

In Mr. PEMBERTON'S work the botany of the Rose and the wild forms of this and other countries are attractively dealt with and form an interesting commencement to a treatise of much practical value. In Miss KINGSLEY'S book the reader will be struck by the beauty and truthfulness of the coloured illustrations.

During the same period we have received from France JAMAIN and FORNEY'S *Les Roses, Roses et Rosiers par des Horticulteurs et des Amateurs de Jardinage,* and HARIOT'S *Livre d'Or des Roses*; these are all remarkable for their coloured illustrations of varying degrees of excellence. The most important practical work however that has come to us of late from France is the recent publication of the Rose Section of the National Horticultural Society of France, entitled *Les plus belles Roses au début du XX^e^ Siècle.* The concise, and at the same time thorough, manner in which the Rose is treated under its various aspects is convincing proof of the ability and carefulness with which the book has been compiled, and if on looking over some of the lists of varieties suggested for cultivation we may find names that do not appear to us to be of special excellence we must remember that the climate of France is of many kinds and differs widely from our own, and also that the canons of taste in Roses are not the same in all countries. I cannot leave the French section of our subject without reference to the publications of the Roseraie de l'Hay, near Paris, where M. GRAVEREAUX has established a magnificent rose-garden with its equipments of library, laboratory, and museum on a scale that has never hitherto been attempted. In addition to richly illustrated catalogues of the botanical and horticultural contents of his collection of Roses, M. GRAVEREAUX has published treatises dealing with the evolution of the Rose from prehistoric times, its place in the sciences, in literature and in the arts; and last year he has given us a very entertaining description of the reconstitution of the rosery of the Empress JOSEPHINE at Malmaison, which he took in hand some two years since.

The periodical literature of the Rose has also made great strides of late years. Although in this country we have not as yet any magazine or journal appearing at stated intervals and devoted entirely to the Rose, as is the case on the Continent, we have the publications of the National Rose Society as well as the numerous well-illustrated articles on the subject that are continually appearing in the horticultural papers, and which serve most effectually to keep alive the interest in the Rose both at home and wherever the English tongue is spoken; they deserve our acknowledgments for what has been accomplished in the past, with our sincere hopes for their continued expansion. In France I am delighted to see the name of COCHET still associated with the conduct of the *Journal des Roses,* a monthly magazine founded no less than thirty-seven years ago by a member of the same family, and readers of the *Lyon-Horticole,* the journal of the Lyons Horticultural Society, still enjoy the practical articles on the Rose and its culture which have appeared at frequent intervals

for so many years from the pen of its talented secretary, Mr. VIVIAND MOREL, who, on more than one occasion, has sent us across the Channel to be read the results of his labours at Rose meetings held in this country. If this gentleman could be persuaded to collect into one volume his numerous essays on the subject the botanical and horticultural literature of the Rose would be very substantially enriched. In Germany the *Rosen Zeitung*, established in 1886 as the organ of the German Rose Society, continues to express and encourage the development in all that pertains to the Rose that is taking place in that country.

In concluding these remarks I feel conscious of the imperfect manner in which I have touched on the fringe only of a large subject; in exploring it fully volumes might be written. I think the literature of the Rose may be compared to a large and exceedingly vigorous bush of the plant itself, the various ramifications of the subject corresponding to the branches of the plant, and the individual works and treatises to the flowers themselves. We know that one flower differeth from another in glory, but in the case of the Rose very few are the blossoms that fail to present a charm of some kind to the passer-by who stops to examine them, or to afford a supply of nectar to those who know how to extract it.

THE ORIGIN OF LIFE—UNDISCOVERABLE.

By Rev. Prof. G. Henslow, M.A., V.M.H.

[Read April 15, 1913; Mr. J. A. Alexander, F.R.H.S., in the chair.]

As Professor Schäffer's address to the British Association in 1912 is nearly the latest exposition of any ideas dealing with "The Nature, Origin, and Maintenance of Life," it will be desirable to begin by inquiring how far he succeeded in replying to the question, "What is the *nature* and *origin* of life?" for this question has never been answered; though we know something as to how the *maintenance* of our own lives is sustained.

Having shown the inadequacy of all former definitions of life which could completely exclude lifeless minerals, and declining to make a new definition, he observed that "the dividing line between animate and inanimate matter is less sharp than it has been hitherto regarded." *

The Professor starts with the general impression "that spontaneous movement is a sign of life." A simple illustration may be seen if a drop of ditch-water be placed under a covering glass, when numerous very active living bodies will be observed rushing about, indicating great liveliness. If now the tip of a camel's-hair brush dipped in tincture of iodine be run in under the covering glass, everything comes to instant rest, all the living and moving organisms being instantaneously killed.

He observes that many *apparently* spontaneous movements may be seen to take place in the inorganic world. Thus, molecules of water when it freezes "move into line," as when a snow-crystal is being made. Small bubbles in a teacup rush to attach themselves to a large one; but in all cases there is a force acting upon the molecules, *externally*, which causes them to do this. We call it "attraction" or gravity, &c.; but what the forces *are* and *why* they bring about the so-called attractions between molecules no one knows. There is, however, a sameness or *constancy* about them in all inorganic matter; so that, as in the contraction and expansion of iron, precise results can be safely predicted.

Many movements in living organisms can also be predicted, provided the same external stimulus be applied or the same internal laws of growth are obeyed; thus, many leaves "sleep" at night, and shoots circumnutate; but the seat of all such plant movements resides in the living protoplasm *within* the organism; kill *that* and all such movements cease. External influences are now of no avail.

On the other hand, if a broken crystal of alum be put into a basin containing a hot, saturated solution of alum, as it cools the alum is crystallized out, not only completing the broken crystal till it is a perfectly symmetrical cube or octahedron (*i.e.* two four-sided pyramids

* The quotations are from the report of Dr. Schäffer's lecture in *The Daily Telegraph*, September 5, 1912.

united base to base), but other crystals may be formed. There is no deviation in the process, and what will happen is well known beforehand.

The site of the cause of the movement of the molecules is *external* in the case of the alum, but is *within* a living organism; though the inciting *cause* may also be from without, as a lowering of light and temperature in the evening brings about the sleeping of leaves by a *response* from within.

Professor SCHÄFFER, therefore, would seem to be inaccurate in saying "inorganic crystals grow, multiply and reproduce their like, given a supply of the requisite pabulum." Growth goes on from *within* an organism, through food taken into the interior of the body. A crystal increases in size—but there is no *growth* in the proper sense of the word—solely by accretions on the external surface; *i.e.* by additions from a solution of the same substance.

Organic growth is only possible by a division of the cells of the growing organ; and, as all biologists are aware, this is secured by a most intricate process executed by the nucleus of the cell. There is nothing like it in the inorganic world. "Growth" in the sense of increase of size in mineral particles by accretions from without is an altogether inadequate term when applied to organic beings.

"Pabulum," to use Professor SCHÄFFER'S term, may vary very much, and out of it life selects what is wanted and rejects the remainder as indigestible. Even the insectivorous sundew will consume all the nitrogenous substances and refuse the hard chitinous surface of a fly. Moreover, the food must pass through various chemical changes under the directivity of life before it is capable of bringing about any growth of the organism.

Again he says crystals "multiply." This term is also inaccurate. If a crystal weighing an ounce, say of alum, is dissolved in water, when the water has evaporated a cluster of separate crystals may result; but the whole of them will weigh exactly one ounce. There is absolutely nothing comparable to the million eggs from one oyster. The addition of more alum as "pabulum," only makes more crystals till the alum has all been crystallized out of the solution. It cannot "nourish"; whereas any multiplication of living organisms requires nourishment for growth and development: without it a bulb cannot produce bulbils, nor flowers any seed. There is really no comparison between the two.

Now let us consider the nature of protoplasm, which consists of the lifeless elements—carbon, nitrogen, hydrogen, oxygen, phosphorus, sulphur and some mineral salts. It is the only compound known which is the *vehicle of life*, but is lifeless in itself.

A mineral called mascagnite has four out of the above five elements, and is composed as follows, $N_2H_{10}O_5S$; but the composition of albumen (perhaps the nearest ally of protoplasm) is $C_{60}H_{100}N_{16}O_{20}$.

Dr. CAMPBELL tells us that an analysis of the plasmodium of a slime-mould (*aethalium*) showed eight "ferments" as well as ammonium

carbonate, forming 30 per cent. of nitrogenous compounds; in addition are 41 per cent. of ternary compounds, such as resin, pigment, sugar, fatty acids, and neutral substances. Lastly, minerals are present, combined with various acids. "This illustrates," writes Dr. CAMPBELL, "the extraordinary complexity of the protoplast, and the impossibility of obtaining more than an approximation of its chemical constitution."*

Protoplasm, therefore, does not seem to be quite so simple a substance as HAECKEL thought. MCCABE, too, says, "There is no reason why they [the earliest living things] may not have evolved from the inorganic world." †

The fundamental objection would seem to be in the question, Whence could the necessary ingredients of protoplasm be found all together in sea-water? That is, if, as MCCABE says, the first living beings arose from the ocean: a proposition I would venture to dispute. Secondly, even supposing all the necessary elements were all present simultaneously, how will they combine in the extraordinarily high proportions, as in the above cases? He admits "a particle of plasm is a thing of wonderful and undeterminable potentialities." Mineral compounds never unite with their elements in high proportions; then why should protoplasm?

As sugar, *e.g.* glucose ($C_6H_{12}O_6$), may only differ from starch ($C_6H_{10}O_5$) by one molecule of water (H_2O), and where starch is turned into sugar all the phenomena of the former are replaced by those of the latter; so when the necessary elements are combined and protoplasm results, then, it is argued, all the phenomena of life will be manifested. What is the proof? Neither induction nor experiment is forthcoming, Conversely, as stated, a drop of the tincture of iodine instantaneously dispels life in an active zoospore; but the protoplasm remains the same, as far as we know, for a time, at least; *i.e.* until decomposition takes place.

A bullet through the heart does the same things with the same results. How can we assert that if protoplasm were made synthetically in the laboratory it would *not* be lifeless? Life is something superadded to the material basis and physical forces in protoplasm; for it can be removed, as we have seen, and protoplasm unaltered remains.

The question may be asked, Which came first, Life or Protoplasm? From all practical experience we know that no new protoplasm comes into existence without life, any more than life can come without pre-existing life in protoplasm.

Yet MCCABE assures us that "We have found that the world of life is not separated from the inanimate world by a yawning gulf. . . . We find tiny creatures whose life is hardly worth calling life." ‡ Why not? What has size got to do with it? To watch the vegetable and animal creatures in a drop of ditch-water one would say they are as much alive as men in a football match, to judge by their motions.

* *A University Text-Book of Botany*, by D. H. Campbell, Ph.D., 1902.

† *The Origin of Life*, p. 34. ‡ *Op. cit.* p. 59.

Life cannot be measured by quantity. It does not increase with age or size.

McCabe says "it consists merely of 'metabolic processes.'" But why are there no such in any known mineral body? The word "merely" does not enable one to fill the "yawning gulf" or even the merest crack! He adds: "There is no feature in their life that we can claim to be beyond the range of a subtle synthesis of inorganic energies." There are at least two, not only in microbes, but in man himself. One is the metabolic process itself, to which he refers, such as the absorption and digestion of food *within* the body for the forming and restitution of the organs and maintaining the life of the organism.

The *energies* are purely physical, the *matter* all inanimate; but what *determines* or *directs* the forces so that they place the inorganic substances just where they are wanted? McCabe does not allude to this. The metabolic processes of digestion terminate in blood. This is the substance for building up and renewing the organs of a body. Life is like a train starting from a terminus, laden with parcels *directed* to various stations. For so, too, the blood leaves the heart, impelled by it as a force-pump. It travels all over the body but never stops. It discharges its lime where bones are being formed, its silica for the nails, teeth and hair; its salt is dissolved in the tear-glands, but not in the mouth, &c.

Then, as trains bring back "returned empties," so the red blood-corpuscles, having carried the oxygen of the air to all parts of the body for respiration, bring back the useless carbonic acid and discharge it into the air. There is nothing comparable with respiration in the inorganic world, though the oxidizing or burning process is common enough.

A most important point has been seemingly and entirely overlooked by those who would try to close up the gulf between the living and the non-living; and that is respiration.

The microbe organisms suggested as being more or less like the hypothetical primeval ones, are not only *not* green, and therefore cannot assimilate inorganic food, but are parasites or saprophytes, *i.e.* feeding on living or decaying *organic* substances. Such microbes must *breathe* or die; and respiration, which is an oxidizing process, is the means by which energy is continually supplied to them for growth, development and reproduction. Nothing approaching respiration is known in the inorganic world; the oxidation of metals &c. or "rusting" is of course abundant; but this, once done, is not renewed, and no results follow as from breathing. With regard to the origin of respiration, like that of assimilation, it is a complete blank in our knowledge.

Moreover, like all ordinary combustions of inorganic substances, rusting begins on the *outside* and works inwards in minerals; whereas breathing is *internal* in all plants and animals and the products (CO_2 and H_2O) are exhaled.

Judging from existing facts, the first living organism should have

been green with chlorophyll. If this supposition be right, as soon at the first speck of protoplasm was formed it must then have developed chlorophyll; but the lowest organisms now existing, with which HAECKEL would compare the first living beings, as far as we know have none. They all live upon organic substances, alive or dead, and their products.

There is yet another contrast. It is a fundamental fact or law that no inanimate mineral, whether solid, liquid or gaseous, if in motion, can direct itself. There must be a *vis a tergo*, or a directing power, to determine its path; so, when we see the result of molecular motion, as, *e.g.*, in the development of a thigh-bone with an arched summit in order to support the whole weight of the body, we discover a structure very different from a basin-like depression of clay to which an artesian well can be sunk, however useful that depressed bed of clay may be to stop and hold the water.

What, then, determines molecular motion? Mr. JAMES CROLL * asked this question in 1872, and says the correct answer will solve the fundamental problem of Nature.

The only thing that can and does do it is directivity.

It is this "directivity" of life which alone determines in what organs the several ingredients of the blood shall be deposited, severally. But all this is something over and above the purely metabolic processes, executed with lifeless force and matter, alone.

MCCABE adds: "Another conjecture is that life may be itself a simple and eternal form of energy, like electricity."† If so, we should expect to find it to be interchangeable with other physical forces, according to the principle of the conservation of energy.

What, then, is the result of this inquiry? MCCABE says, "The evolutionist must assume that something like the [imaginary] biogens [*i.e.* life-begetters] preceded the microbe in point of time." ‡ But the supposed biogen is still a particle of plasm; and we have not in Nature any series of inorganic substances bridging the distance between plasm and inorganic matter, or between imaginary biogens and living microbes. He then alludes to PFLÜGER'S observation that cyanogen (bicarbide of nitrogen), only made by intense heat may have supplied the physical basis of life; inasmuch as our earth passed through and cooled from a condition of great heat, "Why may not vast quantities of cyanogen or cyanic compounds have been produced at that time?" then follows an imaginary series of chemical changes involving one "might," one "should," and eight things that "would" occur; yet the whole is purely imaginary.

We thus return to our starting-point. The "yawning gulf" is still there, and, so far as we can see, it is likely to remain.

The whole difficulty lies in the fact that we do not know what life is, nor how it acts or guides forces which cannot guide themselves, nor how it holds chemical forces in its power, making organic substances

* *Philosophical Magazine*, July 1872.

† *Op. cit.* p. 63. ‡ *Op. cit.* p. 65.

unknown in the inorganic world, as blood, flesh, bone, &c.; how it prevents putrefaction and decay, which set in as soon as life is gone; and many other things familiar to all.

If we cannot explain the *power* of life we are not likely to know its *essence* or nature, much less its *origin*.

HAECKEL, whom MCCABE would seem to represent in England, thinks all things may be grouped into *one* substance, matter and force; why, therefore, not into *two* is not clear. This is the basis of his theory of monism. Moreover, HAECKEL makes DARWIN responsible for this theory of monism. He says: "Darwin has not only *proved by his theory of selection* that the orderly processes in the life and structure of animals and plants have arisen by the mechanical laws without any preconceived design, but he has shown us in the 'struggle for life' the *powerful natural force* which has exerted supreme control over the entire course of organic evolution for millions of years." *

I italicize the two most obvious fallacies in the above assertion. No *theory* can *prove* anything. It has itself to be proved to be true first. *A struggle for life* is not a *force*; the unfit only die from developing "injurious," † *i.e.* inadaptive and consequently *suicidal*, variations of structure. The feature ignored in HAECKEL's theory of evolution is the necessity for *something* to *direct* force which is *not* a force itself. The "conservation of force" is a recognized principle, but it has nothing to do with guidance or directivity; it deals with the *quantity* of force only, but this does not exclude the existence of guidance. Sir O. LODGE observes on the monistic view of absorbing life among the forms of force: "I hold that it is false; because the essential property of energy is that it can [metaphorically] transform itself into other forms, remaining constant in quantity; whereas life does not add to the stock of any known form of energy, nor does death affect the sum of energy in any known way." ‡

Sir O. LODGE suggests that "Life had a pre-existence in some sense, being called out, as it were, from some great reservoir or storehouse of vitality, to which, when its earthly career is ended, it will return." Perhaps ether may be this *vehicle* of life, if there be any truth in his surmise.

Such a suggestion might, in imagination, apply to all animals and plants; but an exception must be made with man, for his individuality or personality will undoubtedly remain, if we accept the widest inductive evidence.

Sir O. LODGE observes that "The serious mistake made concerning this law of energy is to imagine that it denies the possibility of guidance, control, or directing agency." § Yet it is perfectly obvious that animals, though purely automatic, do exercise at least a guidance of forces on matter, as in making nests, &c. In other words, it is the life within them which does it, and so exhibits purposeful results. Man differs from all other animals in being self-conscious and able to

* *Riddle of the Universe*, p. 276.
† *Life and Matter*, p. 157.
‡ *Origin of Species, &c.*, p. 63.
§ *Life and Matter*, p. 23.

recognize his own *will* as the director of his own actions. Thus a batsman determines to drive the ball between two of the "field." The mechanism lies in his arms and the force in the muscles guided by nerves, but the *directivity* is in the *life* in his brain.

Since the preceding was written a little book entitled *The Origin and Nature of Life* has been published by Dr. B. MOORE.* He deals with physical and psychical evolution; electrons and chemical compounds of the earth; building materials for living matter; and discusses crystalloids and colloids, maintaining that the latter lead up to living protoplasm of a colloidal nature. But he can throw no more light upon the origin and nature of life than Professor SCHÄFFER, to whose address he refers. "Atoms, molecules, colloids and living organisms arise as the result of the operations of the *law of complexity* . . . In this manner we can conceive that the hiatus between non-living and living things can be bridged over. . . . Given the presence of matter and energy forms under the proper conditions, life must come inevitably," &c. † Then follows an imaginary process of evolution among colloids—leading up to protoplasm—which contains "must," twice, "would," seven times, "probably" and "could" once each, the whole being purely imaginary, just as is MCCABE's supposition of a parallel process from cyanogen referred to above.

The one great stumbling-block to the acceptance of any and all such theories is, that as soon as an organism comes into existence no account is offered in explanation of the sudden and universal appearance of *directivity* of a kind totally unknown in the inorganic world.

* "Home University Library." † *Op. cit.* p. 190.

REPORT ON THE METEOROLOGICAL OBSERVATIONS MADE AT THE SOCIETY'S GARDENS AT WISLEY DURING 1912.

By R. H. Curtis, Hon. F.R.H.S.

The weather of 1912, and more particularly that of its summer months, presented a strong contrast to the weather of its immediate predecessor, whose brilliant summer was now followed by the coldest and most sunless summer of which we possess reliable records. In August 1911 the temperature at Wisley rose to above 90 degrees, and at the Greenwich Observatory to 100 degrees, whilst the whole summer was remarkable for the number of hot days and for their brilliant sunshine. In August 1912 the highest temperature observed at Greenwich only slightly exceeded 70 degrees, and at Wisley it was but 67 degrees, and never before had an August so generally cold and sunless been experienced.

Taking a general survey of the year it may be described as mild and open during the months of lowest temperature, and as decidedly colder than usual throughout the summer, the difference between the mean temperatures for these two divisions of the year being so slight as to form a very unusual feature. The year was upon the whole a wet one, but to this statement a few districts near the eastern littorals of Ireland and Britain were exceptions. The frequency of rainfall as well as its amount was large, the latter varying from about twenty inches over south-east Essex, normally the driest part of the Kingdom, to 112 inches upon Dartmoor, 140 inches at some of the wettest parts of the Lake district, and to upwards of 200 inches in parts of Snowdonia, these being some of the wettest portions of the Kingdom. The unprecedentedly heavy deluge which fell upon Norfolk is referred to in some detail in the notes for August. On the other hand there was one remarkably dry month—April—when at Wisley there was no rain between April 1 and May 4, a sequence of thirty-two rainless days. Bright sunshine also was very deficient throughout the year, although to this rule London proved a curious exception. At Wisley the total duration was 1,392 hours, one-sixth of which (242 hours) were recorded in April and only 107 hours in August; the average daily duration for the year was 3·8 hours. Gales were numerous but as a rule were not exceptionally severe, nor were they remarkable for the damage they did to trees and to vegetation generally. Snowstorms also were neither numerous nor severe; but in June several hailstorms occurred and 'immense damage to crops' was reported in connexion with a fall of snow and hail which visited Somerset on the 10th of that month.

Attention has been called by various observers spread over a large area, embracing most of Europe and parts of the American continent

to a peculiar whiteness of the sky apparently due to a thin veil of haze, which produced a distinct reduction of the brightness and power of the sun's rays. A great variety of suggestions have been

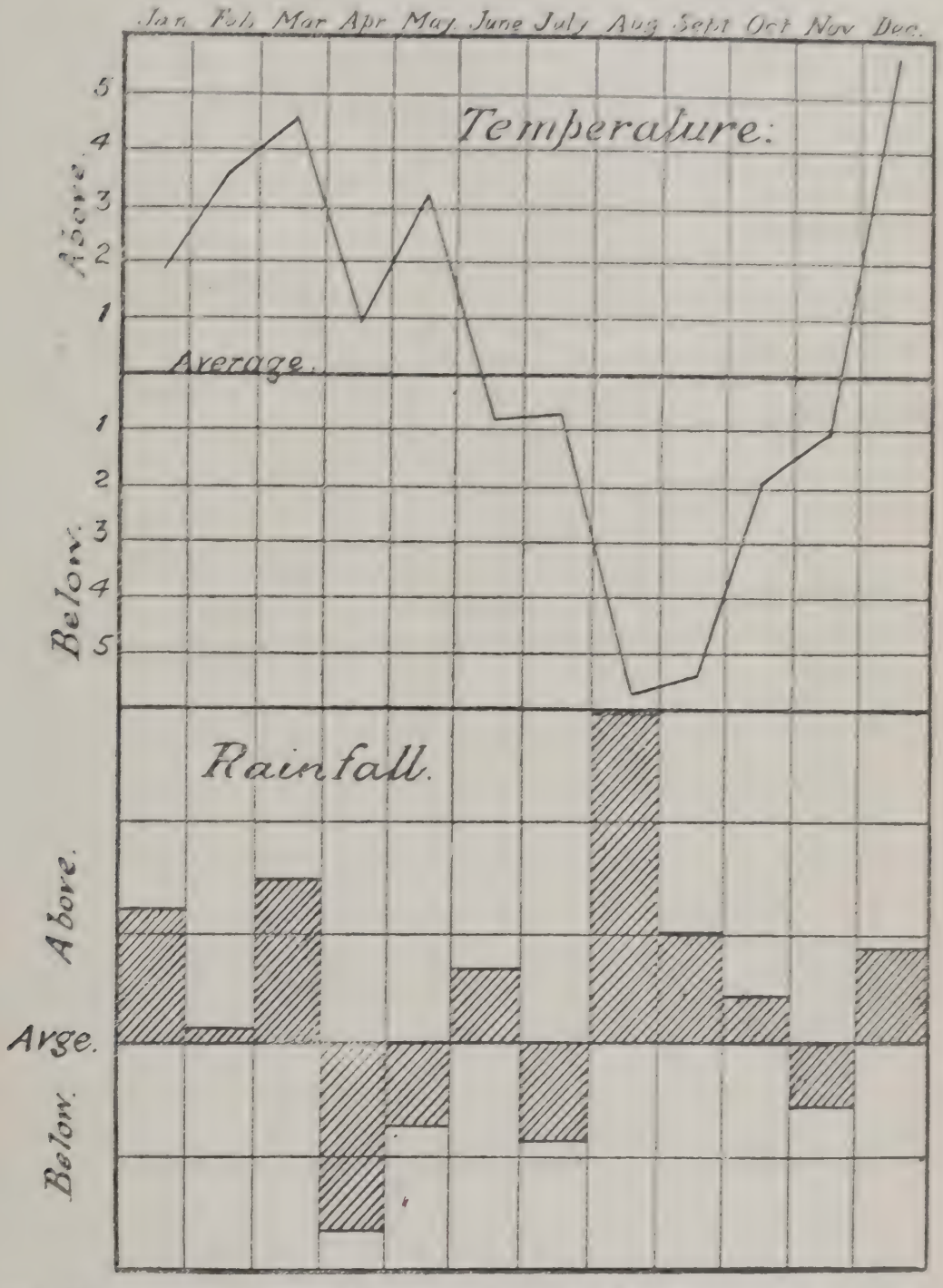

FIG. 18.—DIFFERENCE OF THE MONTHLY MEANS OF TEMPERATURE, IN DEGREES, AND RAINFALL, IN INCHES, FROM THE AVERAGE.

made as to its cause, all of them more or less unsatisfactory, but of the reality of the phenomenon there appears little room for doubt.

The chief features of the year's weather will be readily apprehended from the accompanying diagrams. The first (fig. 18) exhibits the

difference from the average of the mean temperature and rainfall for each month, and the coldness of the summer months, and warmth of the first five months and especially of the last month of the year is clearly brought out. The second (fig. 19) shows the close agreement between the air and earth temperatures due to the very moderate amount of sunshine; and the third (fig. 20) shows the striking predominance of winds from the south-west quadrant over all the others.

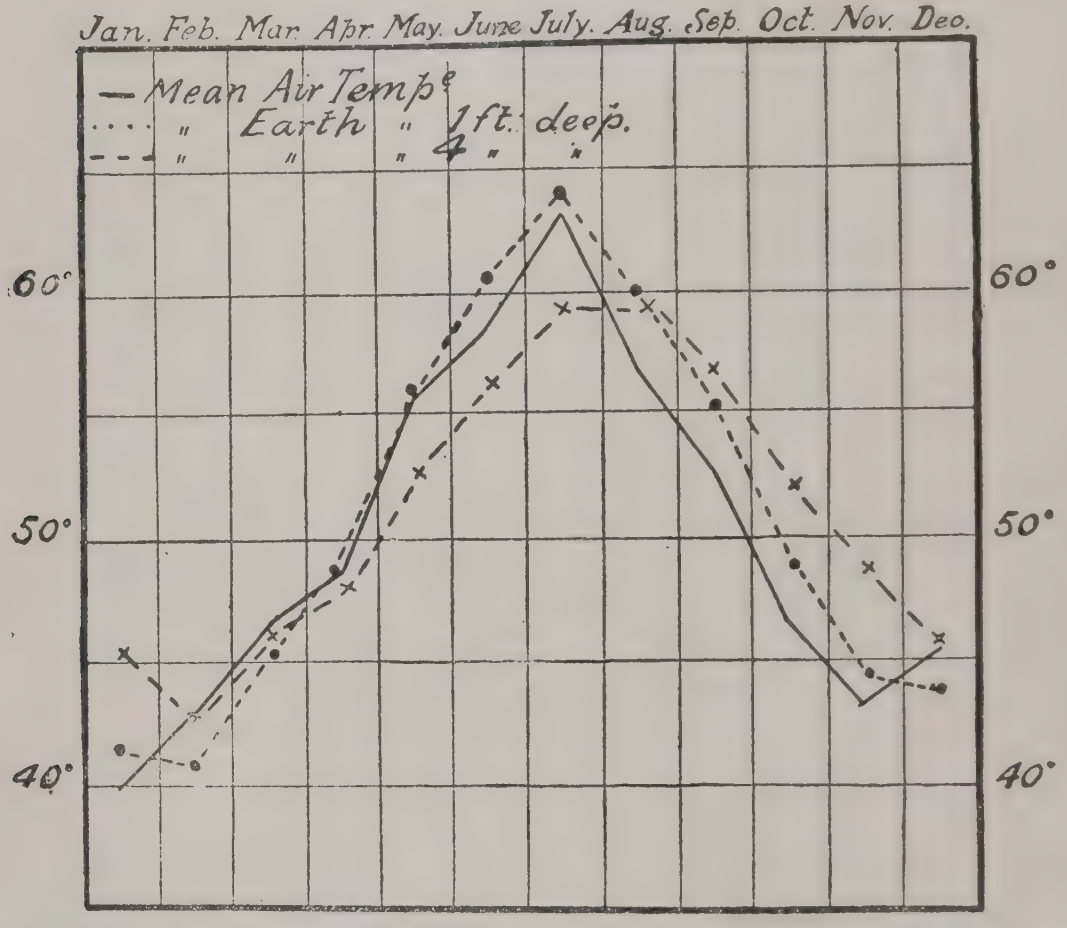

FIG. 19.—MEAN TEMPERATURE OF THE AIR AND OF THE SOIL AT THE DEPTH OF ONE FOOT AND OF FOUR FEET BELOW THE SURFACE FOR EACH MONTH.

The average daily range of temperature is shown graphically in the fourth diagram (fig. 21).

The observations for the several months are as follows:

January.—During the opening days of the year the weather over the United Kingdom was controlled by winds blowing from between south and west; it was therefore mild and open, the temperature rising occasionally to above 50 degrees in all parts of the country and in some to upwards of 55 degrees. Later on, short snaps of cold were experienced, but nevertheless it is fair to say, speaking generally, that throughout the first three weeks the temperature all over the Kingdom was higher than the average for the season. A change then took place and during the last week of January some very low readings of the thermometer were recorded, more than 20 degrees of frost

occurring upon the ground at Wisley during the nights of the 28th to the 30th. The low temperature of this period balanced to a large extent the unusual warmth which had preceded it, with the result that the mean temperature for the whole month was very nearly normal. There were no exceptionally strong winds during the month; but fog was not infrequent, and there was a deficiency of sunshine over the Kingdom generally which was especially marked over the eastern half of Great Britain. At Wisley no sunshine was recorded on twenty days, and in London the total record for the entire month was only nine and a half hours, or less than half the usual amount. Rainfall on the other hand was unusually abundant everywhere except in the extreme north and west. At Wisley a measurable amount fell on 17 days, and the total fall slightly exceeded three inches; but over the entire Thames valley the fall ranged from about three and a half inches to five inches, which is roughly speaking 50 per cent. in excess of the usual amount. A peculiar phenomenon known as 'glazed frost' occurred on the 17th and 18th, when a gentle rain froze as it fell and trees, shrubs, grass, and also telephone wires, fences, etc. became coated with transparent ice to such an extent that large branches of trees were broken off owing to the weight of their icy casing; it was curious to notice that the ground itself was not frozen at the same time that the stalks of coarse grass were each coated with a sheath of clear ice, through which the stalk was seen standing erect.

The results obtained from the observations taken at the Climatological Observatory in the Garden at Wisley are shown in the following table:

January.

Mean temperature of the air in shade . .	39·7°
Highest temperature of the air in shade .	51·5° on the 6th
Lowest temperature of the air in shade .	18·1° on the 29th
Lowest temperature on the grass . . .	8·5° on the 29th
Number of nights of ground frost . . .	16

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M. .	41·5°	42·6°	45·5°
Highest temperature of the soil at 9 A.M.	46·0°	45·1°	46·6°
Lowest temperature of the soil at 9 A.M.	34·8°	38·0°	43·4°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 92%.

Rain fell on 17 days, to the total depth of 3·03 inches (equivalent to about 14 gallons of water to the square yard). Heaviest fall on any day 0·47 inch, on the 17th.

The prevailing winds were south-westerly.

The average velocity of the wind was 5½ miles an hour.

There were 36 hours of bright sunshine, equal to 14 per cent. of the greatest possible amount.

There were 20 days on which no sunshine was recorded.

February.—The frosty weather with which January closed continued and became more severe during the first week of February. At Wisley on the morning of the 3rd a temperature of 17 degrees was recorded by the thermometer in the screen, and the thermometer laid upon the grass and fully exposed to the sky fell to 5 degrees Fahr. But these low readings were considerably above some recorded elsewhere, as in parts of Scotland, for example, where both the screened and the exposed thermometers fell to below zero Fahr. This state of things was, however, of brief duration, and under the influence of a southerly current of air which set in at the close of the first week the weather became much milder, and continued so with a few brief intermissions throughout the remainder of the month. Notwithstanding, therefore, the cold beginning, the mean temperature for the month was much above the average, and indeed over the southern counties it was upon the whole the mildest February experienced for many years. The fall of rain somewhat exceeded the usual amount over some south-western districts, but everywhere else it was below it and was especially slight over the central and eastern counties of England. But although the month was warm and dry it was not sunny, and the record of bright sunshine was less than the average in nearly every part of the Kingdom. The results from the observations made at Wisley are given in the following table:

February.

Mean temperature of the air in shade	42·7°
Highest temperature of the air in shade	57·3° on the 28th
Lowest temperature of the air in shade	16·9° on the 3rd
Lowest temperature on the grass	5·3° on the 3rd
Number of nights of ground frost	16

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M.	40·9°	40·7°	42·8°
Highest temperature of the soil at 9 A.M.	47·6°	45·8°	45·2°
Lowest temperature of the soil at 9 A.M.	33·8°	35·7°	40·9°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 86%.

Rain fell on 16 days, to the total depth of 1·76 inch (equivalent to about 8¼ gallons of water to the square yard). Heaviest fall on any day 0·45 inch, on the 23rd.

The prevailing winds were southerly.

The average velocity of the wind was 8 miles an hour.

There were 48 hours of bright sunshine, equal to 17 per cent. of the greatest possible amount.

There were 9 days on which no sunshine was recorded.

March.—This was a month of unsettled weather, with an excessive rainfall, a general deficiency of sunshine, and a marked absence of warmth by day and also of low temperature at night. The small daily range of temperature was due to the continuously clouded sky

which not only shut off the sun's rays by day, and thus prevented the temperature from rising to its normal height, but at night served as a screen to prevent loss of heat by radiation from the earth's surface, and so maintained throughout the night an unusual degree of warmth. The result was a mean temperature for the month considerably higher than is usual in March; at Wisley the screened thermometer never fell to the freezing point all through the month, a rare occurrence for the third month of the year; there were, however, a few sharp ground frosts, and in the northern parts of the Kingdom the weather was, as might have been expected, somewhat colder than over the southern counties. But the month was a stormy one, with an abnormally large rainfall which in some parts of the country amounted to considerably more than double the average amount. In some of the gales the wind blew very strongly, and associated with one which passed over the country about the close of the third week severe thunderstorms were experienced over a large part of southern England, accompanied in several districts by snow and hail, the snow disappearing, however, very quickly; the general direction of the wind all through the month was from between south and west. The most northern portion of the Kingdom was the most favoured in the matter of sunshine, but at Wisley the average daily amount was but three hours, which is less than 30 per cent. of the possible amount.

The results from the observations made at Wisley are shown in the following table:

March.

Mean temperature of the air in shade	46·5°
Highest temperature of the air in shade	59·9° on the 25th
Lowest temperature of air in shade	32·4° on the 21st
Lowest temperature on the grass	23·2° on the 21st
Number of nights of ground frost	14

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M.	45·3°	45·1°	45·9°
Highest temperature of the soil at 9 A.M.	51·2°	47·6°	47·1°
Lowest temperature of the soil at 9 A.M.	42·3°	43·3°	45·4°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 86%.

Rain fell on 22 days, to the total depth of 2·96 inches (equivalent to about 13¾ gallons of water to the square yard). Heaviest fall on any day 0·58 inch, on the 4th.

The prevailing winds were from between south and west.

The average velocity of the wind was 10½ miles an hour.

There were 98 hours of bright sunshine, equal to 27 per cent. of the greatest possible amount.

There were 3 days on which no sunshine was recorded.

April.—The month opened with a cold northerly wind which was accompanied by a little sleet and snow and by sharp ground frosts at night. A milder air current soon succeeded and the temperature then rose to the usual level, but low ground temperatures were frequent all through the month, and during the night of the 12th the frost at Wisley was severe enough to cause injury to several plants in the open. During the first week strong winds were experienced, chiefly over the northern half of the Kingdom, but they were followed by quiet weather throughout the remainder of the month, and the mean temperature was again in excess of the average for the month. But the chief feature of the weather was the exceptional character of the rainfall. Over the north-western half of Scotland it was in excess of the average but in every other part of the Kingdom it was very much below it, and in England and Wales the month was probably the driest April on record. At Wisley two-hundredths of an inch of rain fell on the 1st and no more throughout the month, and all over the Thames Valley the fall was less than a tenth of an inch. The amount of bright sunshine recorded was exceptionally large; at Wisley it averaged 8 hours a day and there was no day without some sunshine being recorded. On the 17th there was an eclipse of the sun, accompanied by a drop in the temperature of about 6 degrees, the record of sunshine being interrupted for about half an hour.

The results from the observations made at Wisley are shown in the following table:

April.

Mean temperature of the air in shade . .	48·2°
Highest temperature of the air in shade .	70·4° on the 21st
Lowest temperature of the air in shade .	26·5° on the 12th
Lowest temperature on the grass . . .	14·5° on the 12th
Number of nights of ground frost . .	23

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M. .	48·6°	48·3°	48·1°
Highest temperature of the soil at 9 A.M.	51·7°	51·0°	49·0°
Lowest temperature of the soil at 9 A.M.	43·7°	45·6°	46·8°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 74%.

Rain fell on 1 day only, to the total depth of 0.02 inch.

The prevailing winds were northerly and westerly.

The average velocity of the wind was 7 miles an hour.

There were 242 hours of bright sunshine, equal to 59 per cent. of the greatest possible amount.

There were no days on which sunshine was not recorded.

May.—The weather of May presented some sharp contrasts to that of April; right through the month it was of an unsettled type,

abnormally cloudy, with a general deficiency of bright sunshine, but at the same time a shortage of rain over the greater part of the Kingdom and especially over the south-eastern and eastern counties of England. Although there were not many really hot days the mean temperature for the month was again higher than the average; the highest point reached by the thermometer at Wisley was 77 degrees, on the 11th, and there were several nights when the thermometer on the grass fell dangerously low for vegetation—10 degrees of frost were registered at Wisley on the night of the 1st, and 5 degrees on the nights of the 25th

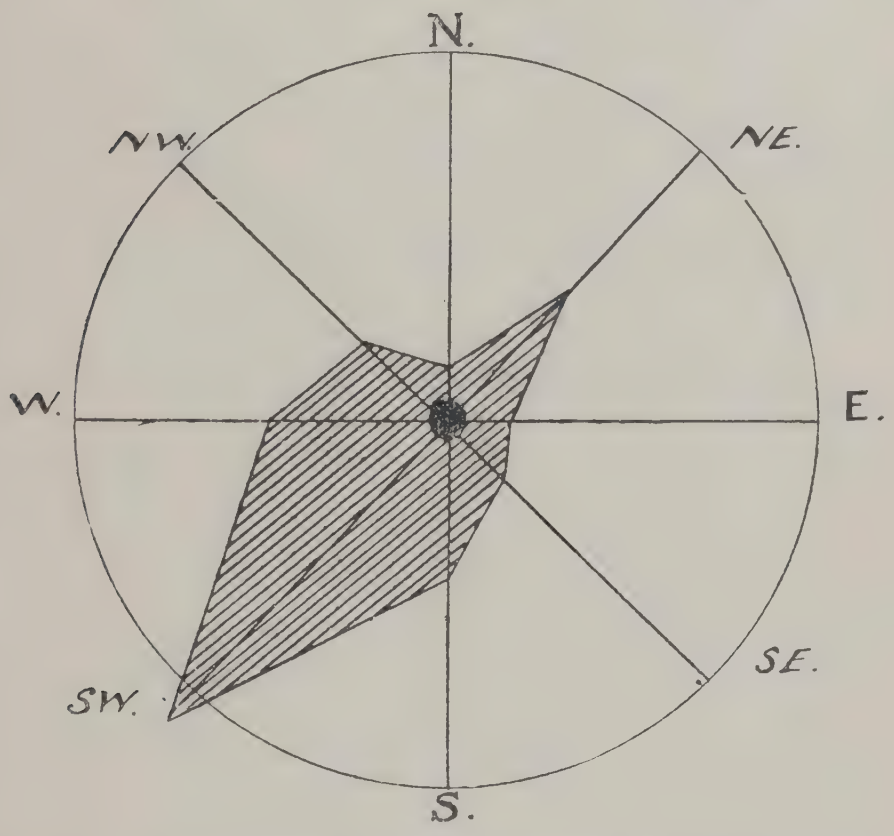

FIG. 20.—DISTRIBUTION OF WINDS DURING THE YEAR. THE RELATIVE FREQUENCY OF CALM IS SHOWN BY THE SHADED CIRCLE IN THE CENTRE.

and 26th, the tips of bracken becoming blackened by the frost on the last-named dates. But as a rule cloudy skies again served to maintain the night temperatures at a fairly high level and thus kept up the mean for the month—the thirteenth in succession warmer than the average; and it is worth noting that the records at Greenwich Observatory fail to show such a long succession of relatively warm months in any former period. Thunderstorms occurred at Wisley on the 12th and 17th, but on the last day of the month one of unusual severity occurred in the neighbourhood of Peterborough. Preceded by a remarkable darkness, it was accompanied by hail and torrential rain. 'After the storm . . . the country was inundated; not merely roads, but hundreds of acres of arable and grass land being under water. Two hours afterwards the hail lay thick on the banks as though a snowstorm had passed.'

The results from the observations made at Wisley are shown in the following table:

May.

Mean temperature of the air in shade	55·6°
Highest temperature of the air in shade	77·2° on the 11th
Lowest temperature of the air in shade	34·1° on the 25th
Lowest temperature on the grass	22·2° on the 1st
Number of nights of ground frost	6

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M.	50·1°	54·5°	52·7°
Highest temperature of the soil at 9 A.M.	60·2°	57·4°	54·8°
Lowest temperature of the soil at 9 A.M.	50·7°	51·0°	49·9°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 74%.

Rain fell on 11 days, to the total depth of 1·25 inch (equivalent to about 5¾ gallons of water to the square yard). Heaviest fall on any day 0·28 inch, on the 30th.

The prevailing winds were from between south and west, and northerly.

The average velocity of the wind was 5 miles an hour.

There were 176 hours of bright sunshine, equal to 37 per cent. of the greatest possible amount.

There were 2 days on which no sunshine was recorded.

June.—The weather of June was of a most unsettled and broken character, due to the influence of a constant succession of atmospheric depressions which reached us from the Atlantic. The third week of the month was the only part of it during which really summer weather was experienced, and on the 19th the temperature at Wisley reached 80 degrees, and 79 degrees three days later; but on nearly every other day of the month the maximum temperature was below 70 degrees whilst on the 3rd the minimum fell so low as 40 degrees. At Wisley there were no ground frosts although on more than one occasion there was a perilously close approach to it. The rainfall was in most parts of the Kingdom excessive, in many districts it was double the usual amount and in a few it was three times the average, whilst there were isolated patches over which the fall was heavier still. But, notwithstanding the heavy rainfall some districts were favoured by an average amount of sunshine, although this was far from being a general experience, over some northern districts less than half the usual amount was recorded, and taking the Kingdom as a whole the record of bright sunshine was very deficient.

The results from the observations made at Wisley are shown in the following table:

June.

Mean temperature of the air in shade . .	58·2°
Highest temperature of the air in shade .	80·2° on the 19th
Lowest temperature of the air in shade .	40·2° on the 3rd
Lowest temperature on the grass . . .	34·2° on the 3rd
Number of nights of ground frost . .	None

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M. .	60·3°	58·7°	56·4°
Highest temperature of the soil at 9 A.M.	65·5°	61·9°	58·7°
Lowest temperature of the soil at 9 A.M.	56·7°	56·2°	54·9°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 76%.

Rain fell on 19 days, to the total depth of 2·52 inches (equivalent to about 11¾ gallons of water to the square yard). Heaviest fall on any day 0·71 inch, on the 7th.

The prevailing winds were south-westerly and westerly.

The average velocity of the wind was 7 miles an hour.

There were 216 hours of bright sunshine, equal to 44 per cent. of the greatest possible amount.

There were 2 days on which no sunshine was recorded.

July.—The month opened and closed with cool cloudy weather, a warm spell occurring during the second week, and another near the beginning of the last week and lasting for a few days. The highest temperature of the month at Wisley was 87 degrees and occurred on the 12th and again on the 15th, but in contrast to these warm days the maximum on the 19th did not reach 60 degrees and the minimum fell below 45 degrees, the thermometer exposed upon the grass falling in the night to 33 degrees—an abnormally low reading for July. The fall of rain at Wisley was not great, but in many parts of the country it greatly exceeded the average; in some parts of Hertfordshire in a thunderstorm which occurred on the 23rd rather more than 3 inches fell, and damage was done to growing crops. At a few places, not usually the most sunny, the average amount of bright sunshine was recorded, but over the greater part of the Kingdom it was very deficient. The Wisley record was 150 hours for the month, only 44 per cent. of the amount registered in the corresponding month of 1911. In July 1910 the total was only 121 hours, but that month and the one now under review were the least sunny Julys during the period covered by the Wisley observations. The combined result of the warm periods near the middle of the month and of the small daily range of temperature generally was a mean for the month very close to the normal.

The results from the observations made at Wisley are shown in the following table:

July.

Mean temperature of the air in shade . .	62·8°
Highest temperature of the air in shade .	87·0° on the 12th and 15th
Lowest temperature of the air in shade .	44·6° on the 19th
Lowest temperature on the grass . . .	33·2° on the 19th
Number of nights of ground frost. . .	None

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M. .	64·1°	62·3°	59·7°
Highest temperature of the soil at 9 A.M.	67·8°	64·9°	61·2°
Lowest temperature of the soil at 9 A.M.	60·0°	59·3°	58·0°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 77%.

Rain fell on 12 days, to the total depth of 1·56 inch (equivalent to about 7¼ gallons of water to the square yard). Heaviest fall on any day 0·35 inch, on the 2nd.

The prevailing winds were north-easterly.

The average velocity of the wind was 5 miles an hour.

There were 150 hours of bright sunshine, equal to 31 per cent. of the greatest possible amount.

There were 2 days on which no sunshine was recorded.

August.—Throughout the whole of this month the weather was of an altogether abnormal type, an almost ceaseless procession of atmospheric disturbances crossing the Kingdom from west to east, bringing with them strong winds, an excessive rainfall, and a great deficiency of warmth. At very few places indeed did the temperature rise to 70 degrees, and at Wisley the maximum was only 67 degrees; at night the screened thermometer frequently fell below 50 degrees, and on one occasion to 41 degrees and upon the grass to 36 degrees. Such general absence of summer warmth has not been paralleled in any August for at least half a century. Over the greater part of the Kingdom the fall of rain was excessive, in many places more than double the usual amount; the exceptions were provided by a few districts which as a rule are amongst the wettest but which in this month of anomalous weather had less than their usual amount of rain. But the most remarkable meteorological incident of the month was the extraordinary fall of rain which occurred over Norfolk and part of Suffolk on the 26th, causing most disastrous floods over a large area of which the city of Norwich was the centre. Between 4 A.M. 26th and 4 A.M. 27th the fall of rain in Norwich measured 7·32 inches, and the rain had not ceased. A calculation based on rainfall observations covering the whole of Norfolk makes it probable that the fall for the entire county averaged 4·88 inches, and the area of the county being 2044 square miles this gives the enormous total of 144,400,000,000 gallons as the amount of water which fell upon it, or "twice as much as

is contained in Windermere, the largest of the English lakes. . . . Had this precipitation fallen in the form of snow the average depth at which it would have lain over Norfolk would have been almost five feet ; " and supposing further that the fall had been accompanied by

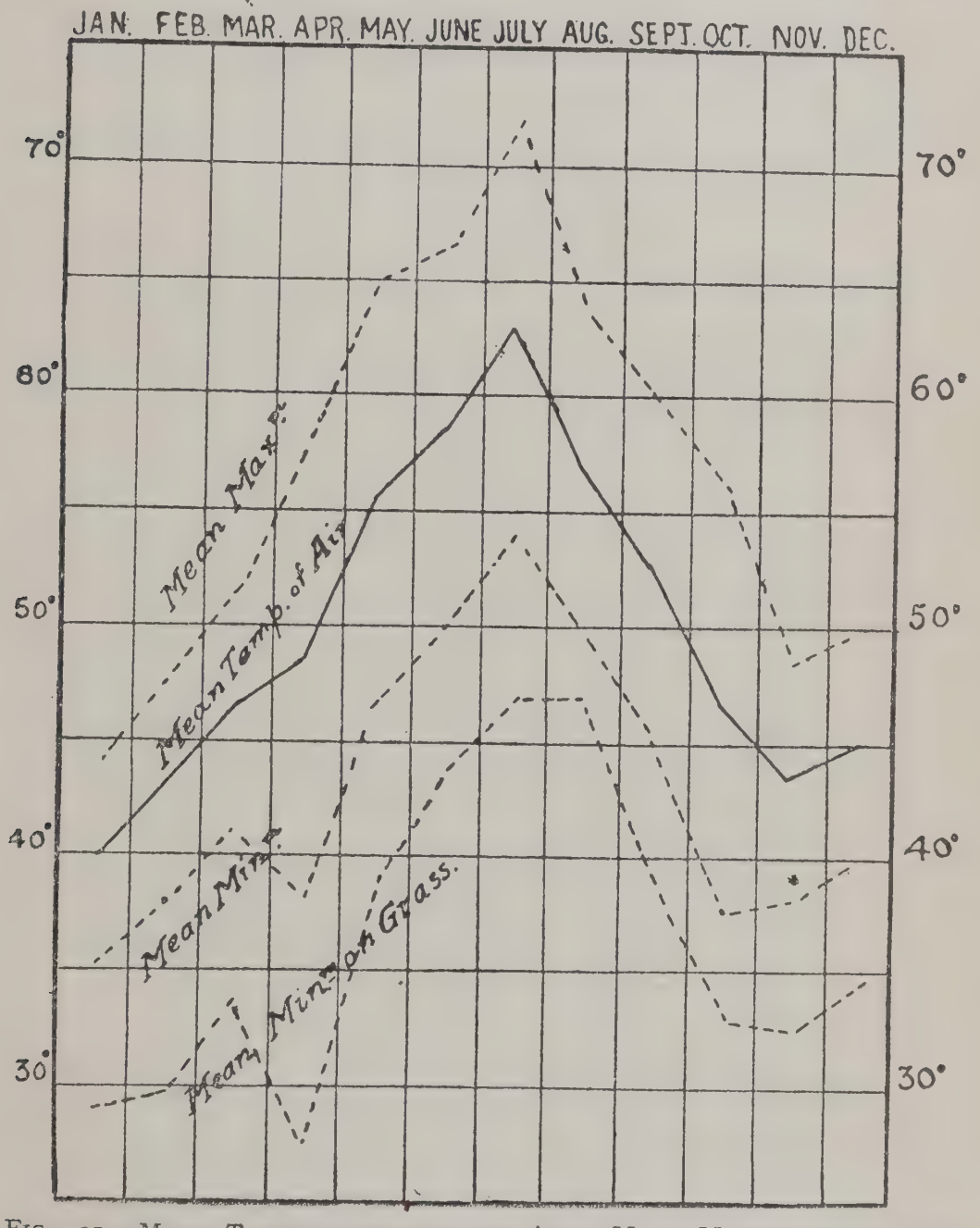

FIG. 21.—MEAN TEMPERATURE OF THE AIR ; MEAN MINIMUM AND MEAN MAXIMUM TEMPERATURE OF THE AIR ; MEAN TEMPERATURE ON THE GRASS, FOR EACH MONTH.

a gale of wind, as was indeed the case in this instance, the drifting which would certainly have taken place would have been disastrous As it was, " the crops in the north-east of Norfolk were destroyed, and the harvest having been postponed to an exceptionally late period owing to inclement weather earlier in the month, the catastrophe now carried away the grain that had been cut but not brought in, and made it impossible to save what remained uncut."

With such weather conditions it is not surprising that the amount of bright sunshine was everywhere small, many places recording less than half the usual amount. "Observers in various parts of the United Kingdom noticed that in the rare intervals of fine weather the sky seldom assumed its ordinary blue tint, but appeared to be covered with a hazy film producing gray whiteness of the unclouded sky and extreme weakness of all sunshine. A similar appearance was noted by several Continental observers."

The results from the observations made at Wisley are shown in the following table:

August.

Mean temperature of the air in shade	56·7°
Highest temperature of the air in shade	67·6° on the 4th
Lowest temperature of the air in shade	41·2° on the 3rd
Lowest temperature on the grass	36·0° on the 3rd
Number of nights of ground frost	None

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M.	60·0°	59·8°	59·4°
Highest temperature of the soil at 9 A.M.	62·5°	61·7°	61·0°
Lowest temperature of the soil at 9 A.M.	57·6°	57·8°	58·4°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 1000), 82%.

Rain fell on 26 days, to the total depth of 4·77 inches (equivalent to about 212 gallons of water to the square yard). Heaviest fall in any day 0·54 inch, on the 25th.

The prevailing winds were south-westerly.

The average velocity of the wind was 7 miles an hour.

There were 109 hours of bright sunshine, equal to 24 per cent. of the greatest possible amount.

There were 3 days on which no sunshine was recorded.

September.—This was another exceptionally cool month, the highest temperature reached at Wisley being only 66 degrees, and similarly low maxima were experienced all over the Kingdom. The coolness of August was due to the constant succession of atmospheric disturbances arriving from the westward and bringing with them cold winds from the Atlantic region, but now the conditions were changed and the cold was due to persistent northerly or easterly winds which were not only cold but very dry also. Until the last three days of the month practically no rain at all fell over a large part of the Kingdom, although the sky had been persistently cloudy and the amount of bright sunshine everywhere very small. But on the 28th the drought came to an end, and the amount of rain which fell during the last three days was sufficient to raise the total for the month in some districts to the average or even above it, and in others to about half the normal

amount. Like its predecessor the month was colder than any corresponding month for fifty years back, and both months afforded striking contrasts to the warm and brilliant corresponding period of 1911 So early as the 3rd there was a ground frost at Wisley sharp enough to damage marrows and runner beans, but on the night of the 27th there were eight degrees of frost and the dahlias were quite destroyed.

The results from the observations made at Wisley are shown in the following table:

September.

Mean temperature of the air in shade	52·6°
Highest temperature of the air in shade	66·0° on the 4th
Lowest temperature of the air in shade	32·5° on the 27th
Lowest temperature on the grass	23·6° on the 27th
Number of nights of ground frost	5

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M.	55·3°	55·8°	56·8°
Highest temperature of the soil at 9 A.M.	59·7°	59·3°	58·6°
Lowest temperature of the soil at 9 A.M.	50·8°	52·8°	54·7°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 82%.

Rain fell on 4 days, to the total depth of 2·99 inches (equivalent to about 14 gallons of water to the square yard). Heaviest fall on any day 1·58 inch, on the 29th.

The prevailing winds were westerly from between south-west and north.

The average velocity of the wind was 5 miles an hour.

There were 124 hours of bright sunshine, equal to 33 per cent. of the greatest possible amount.

There were 3 days on which no sunshine was recorded.

October.—This was another cool month, although relatively it was less so than August and September had been. A temperature of 60° is a very moderate maximum for October, but even so at Wisley it was reached only on six days in the course of the month, and on five other days the thermometer failed to rise so high as 50°. The mean temperature was therefore low generally, and everywhere ground frosts were frequent and occasionally severe; in some Midland districts the thermometer on the grass fell more than once to below 20°. It was, however, a quiet month without strong winds, but with a good deal of fog, especially in the early and late hours of the day. In the neighbourhood of London and other large cities the fog interfered with the record of bright sunshine, but over the country generally the number of hours recorded was rather above the average, and this was especially the case in the south-east of England. The first half of the month was dry, very little rain falling until the 20th, but from that day to the

close of the month nearly every day was a wet one and in most districts the total rainfall for the month was fairly close to the average amount.

The results of the observations made at Wisley are as follows :

October.

Mean temperature of the air in shade	46·6°
Highest temperature of the air in shade	63·2° on the 13th
Lowest temperature of the air in shade	26·8° on the 6th
Lowest temperature on the grass	22·7° on the 6th
Number of nights of ground frost	17

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M.	49·0°	50·0°	52·2°
Highest temperature of the soil at 9 A.M.	54·7°	54·1°	54·9°
Lowest temperature of the soil at 9 A.M.	45·4°	47·9°	50·6°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 92%.

Rain fell on 13 days, to the total depth of 2·74 inches (equivalent to about 12¾ gallons of water to the square yard). Heaviest fall on any day 0·56 inch, on the 1st.

The prevailing winds were south-westerly and north-easterly.

The average velocity of the wind was 5 miles an hour.

There were 129 hours of bright sunshine, equal to 40 per cent. of the greatest possible amount.

There were 6 days on which no sunshine was recorded.

November.—Throughout this month the weather was of a very changeable character, although until near its close there were no serious gales or other phenomena of special note. Probably the most outstanding feature of the weather was the unusually high temperature for November which was experienced over all the western parts of the Kingdom at the beginning of the second week, when maxima approaching to 70 degrees were recorded at several places near Dublin and in co. Wicklow, whilst further to the east the temperature varied but slightly from the normal. No really severe weather occurred until the commencement of the last week, when a severe southerly gale swept the whole Kingdom, bringing with it heavy rain, and over the northern counties deep snow, followed everywhere by a sharp fall of temperature and severe ground frosts. At Wisley the thermometer on the grass fell to 19°, but over the north of England readings 10° lower than that were general. Rain fell frequently throughout the month, but as a rule the falls were slight and in most districts the monthly totals were a good deal lower than the average. The record of bright sunshine was also very low generally, the most favoured region being the east of Scotland ; but many parts of the country which usually are the most sunny had less than 20 per cent. of their possible amount—Jersey received only 16 per cent. and Wisley but

13 per cent.; whilst London could only boast of a total of 15 hours, which is but 6 per cent. of the possible amount.

The results of the observations made at Wisley are shown in the following table:

November.

Mean temperature of the air in shade	43·2°
Highest temperature of the air in shade	56·0° on the 7th
Lowest temperature of the air in shade	26·3° on the 3rd
Lowest temperature on the grass	17·7° on the 3rd
Number of nights of ground frost	10

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M.	44·6°	45·9°	48·8°
Highest temperature of the soil at 9 A.M.	49·5°	49·0°	50·9°
Lowest temperature of the soil at 9 A.M.	39·7°	42·9°	47·1°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 90%.

Rain fell on 16 days, to the total depth of 1·83 inch (equivalent to about 8½ gallons of water to the square yard). Heaviest fall on any day 0·48 inch, on the 28th.

The prevailing winds were south-westerly.

The average velocity of the wind was 6 miles an hour.

There were 35 hours of bright sunshine, equal to 13 per cent. of the greatest possible amount.

There were 12 days on which no sunshine was recorded.

December.—The cold weather with which the preceding month closed continued into this, and in its opening days some low temperatures were recorded by the screened thermometer as well as by the thermometer exposed upon the grass. At Wisley the latter fell to 17°, but at places further north it recorded zero, and at a few it fell even lower. But very soon a series of atmospheric disturbances began to reach us from the Atlantic and with their arrival mild southerly winds set in and continued throughout the month—occasionally, and particularly at about Christmas, blowing with great violence over the western parts of the Kingdom. The weather therefore became exceptionally mild, and in some places, of which Wisley was one, the mean for the month was as much as 6 degrees above the average. Rainfall was also abundant and in some parts excessive, but its distribution over the Kingdom was somewhat peculiar; north-eastern England and Aberdeenshire had less than the average for those districts, but the Midlands had rather more than their average fall, and over all the western half of the Kingdom there was so large an excess that in many parts the average fall was more than doubled. With so much rain the month was unusually dull and the record of sunshine below the average amount; at Wisley two days out of every three were either entirely sunless or the sun shone for less than a quarter of an hour.

The results from the observations made at Wisley are as follows:

December.

Mean temperature of the air in shade	45·2°
Highest temperature of the air in shade	55·7° on the 14th and 27th
Lowest temperature of the air in shade	26·4° on the 1st
Lowest temperature on the grass	16·8° on the 1st
Number of nights of ground frost	9

	At depth of 1 ft.	2 ft.	4 ft.
Mean temperature of the soil at 9 A.M.	43·7°	43·8°	45·7°
Highest temperature of the soil at 9 A.M.	47·6°	46·0°	46·9°
Lowest temperature of the soil at 9 A.M.	38·5°	40·9°	45·4°

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100), 88%.

Rain fell on 20 days, to the total depth of 2·55 inches (equivalent to about 12 gallons of water to the square yard). Heaviest fall on any day 0·56 inch, on the 25th.

The prevailing winds were from south and south-west.

The average velocity of the wind was 10 miles an hour.

There were 33 hours of bright sunshine, equal to 14 per cent. of the greatest possible amount.

There were 13 days on which no sunshine was recorded.

THE CONIFERS OF THE LINDLEY HERBARIUM; BOTANY SCHOOL, CAMBRIDGE.

By R. A. Dümmer, F.R.H.S.

Professor A. C. Seward having deputed me to name and rearrange the Conifers preserved in the Herbarium of the Botany School, Cambridge, it occurred to me that a list of those contained in the Lindley Collection would not be without interest in view of the study Dr. Lindley devoted to this group of plants.

Shortly after his death his Herbarium was offered to Kew; but for various reasons it was refused and Kew contented itself with his unique collection of Orchids, in the study of which Lindley particularly excelled and distinguished himself.

In 1866 Cambridge purchased the remainder of his collections, which are computed to consist of 58,000 sheets, truly a striking testimony to the zeal of the man; but the incorporation of the sheets into the general collection was not begun until 1901; shortly afterwards the work was dropped, and it was not till January 1905 that it was recommenced, and it has proceeded systematically up to the present time, though there still remain many cabinets awaiting attention. The general collection is in an excellent state of preservation and the specimens are mounted on exceedingly thick, greyish, prominently ribbed sheets, 18 × 11 inches in size. The genera covers slightly exceed the contained sheets in size, are greyish-brown in colour, and of a firmer texture than those universally employed now.

As the collection is arranged according to Bentham and Hooker's *Genera Plantarum* the genera covers are accompanied by small white labels indicating the genus and the volume and page of the cited work. Small oblong white labels, reading 'Cambridge Bot. Mus. Herb., J. Lindley, Ph.D., purchased in 1866," are pasted in the upper left-hand corner of the sheets bearing the specimens.

Lindley's intimacy with the leading botanists of the day, such as Hooker, Bentham, Gordon, Endlicher and others, as well as travellers such as Wallich, Royle, Hartweg, Douglas, and Gould Veitch, and his secretaryship of the Royal Horticultural Society and editorship of the *Gardeners' Chronicle and Agricultural Gazette*,* all conspired to the formation of his huge collection, and particularly to the accumulation of a fine set of Conifers. These total 378 sheets and are included in 52 genera covers, and the presence of "types" considerably enhances their value. Like everyone else, Lindley was not infallible, and scattered throughout the collection are wrong

* Cf. *Gardeners' Chronicle and Agric. Gazette* (1865), pp. 1058-59; 1082-83.

identifications as well as perplexing and pardonable mixtures. Thus the specimen which he regarded as *Chamaecyparis thurifera*, Endlicher, turns out to be a peculiar variant of the Chinese Arbor-Vitae, *Thuja* (*Biota*) *orientalis*,* while his labelled specimen of *Abies grandis* is *A. amabilis*, though not the *A. grandis* ascribed to him. Similarly, his *Abies Alcoquiana* represents a mixture of the cone-scales of *Picea bicolor* and the leaves of *P. hondoensis*; the two sheets of *Microcachrys tetragona* contain that species as well as *Phaerosphaera Hookeriana*, and, not to add unnecessarily to the list, one of his specimens of *Abies Webbiana* is *A. homolepis*.

In the tabulation of the specimens I have thought it desirable to follow the sequence in which these are preserved in the Herbarium, and where any doubt has existed as to the correct status of any particular specimen, I have availed myself of the facilities of the Kew Herbarium, and have instituted comparisons. The cones relating to the specimens were, unfortunately, in the majority of cases removed to the adjoining Botanical Museum, and as no numbers or notes connect these with the mounted specimens, it is obviously impossible to recognize them without the expenditure of infinite trouble and loss of time.

Three non-gymnospermous specimens were included in the Podocarp cover, a *Hakea* species which in the absence of flowers or fruit is further indeterminable, *Drapetes Dieffenbachii*, a Thymelaeaceous alpine plant from New Zealand, and an undescribed *Bertya*, for which the name *B. neglecta* † has been proposed.

I am indebted to Professor A. HENRY, whose knowledge of the cultivated Conifers is unique, for criticizing or verifying my identifications, and in conclusion beg to tender my thanks to Professor SEWARD for permitting the publication of this List.

LIST OF CONIFERS IN THE LINDLEY COLLECTION.

CALLITRIS GLAUCA, *R. Brown ex Mirbel in Mém. Mus. Paris*, xiii., 74 (1825).

A fruiting specimen collected by Lieutenant-Colonel Sir T. L. Mitchell in June 1846, *not* 1845 (No. 137), labelled '*Callitris*, sp. nov. Sub-Tropical New Holland.'

Baker and Smith, in their *Research on the Pines of Australia*, 120 (1910), state that two specimens of this species are in the Lindley Herbarium; but I can find only one which I can conscientiously assign to this species, the other which I presume they mean being *C. intratropica*, as is evident by its blackish non-tuberculate cone and the solitary or paired cylindric male strobiles.

C. INTRATROPICA, *F. Mueller ex Bentham, Fl. Aust.* vi., 237 (1873). (*Frenela robusta* var. *microcarpa*, Bentham, l.c.)

A specimen in fruit, labelled '*C. glauca*, Sub-Tropical New Holland,'

* Cf. *Gardeners' Chronicle* (1913).
† Cf. *Op. cit.* (1913).

and gathered by Lieutenant-Colonel Sir T. L. Mitchell on Sept. 5, 1846 (No. 287 or 293).

C. ARENOSA, *Cunningham ex Baker and Smith*, l.c. 157, not *Sweet*.

A sterile specimen collected by Hooker in 1835 at Moreton Bay and labelled '*C. arenosa*.'

C. MORRISONI, *R. T. Baker in Proc. Linn. Soc. N.S. Wales*, xxxi., 717 (1907).

A sterile specimen labelled '*C. robusta*,' collected by A. Cunningham at Rottennest Island ; the identification cannot be wholly decisive in view of the absence of cones, which are absolutely essential in the correct interpretation of the species comprising this extremely difficult group. Three specimens showing male strobiles and labelled '*C. pyramidalis*, Hort. Kew,' may belong here, but the deficiency of cones renders this speculative.

C. OBLONGA, *Richard, Conif.* 49, t. 18, f. 2 (1826).

A robust sterile specimen so named, but queried, and labelled 'Van Diemen's Land, Gunn, 542.'

C. CALCARATA, *R. Brown ex Mirbel in Mém. Mus. Paris*, xiii. (1825), 74.

A sterile specimen on the same sheet as the preceding, with male strobiles, labelled '*C. Gunnii* J. D. H. ; Van Diemen's Land, Gunn, 542.' The much shorter internodes of this specimen oppose its identification with *C. oblonga*, but here again the absence of cones renders the identification only approximate. The cone contained in an envelope below the specimen presumably belongs to the specimen to the right, *C. oblonga*.

C. TASMANICA, *Baker and Smith, Pines of Australia*, 233 (1910).

Two specimens, the one sterile and labelled '*C. australis*, Hort. Kew,' the other cone-bearing with an appended note, 'This was Tenore's *Thuya articulata* in 1832 ; it is *Th. australis* in 1838.'

C. QUADRIVALVIS, *Ventenat, Decades* 10 (1808).

Three sheets : 1. A specimen with male strobiles labelled '*Thuya articulata*, Hort. Loddiges 1821.' 2. Two specimens with immature blackish glaucescent cones, with a note by Schombold respecting the habitat and peculiarities of the species. 3. A sterile specimen labelled '*T. articulata*, H. H. J.'

C. MACLEAYANA, *F. von Mueller in Rep. Burdek. Exped.* 17 (1860).

A print depicting *Octoclinis Macleayana*, Ferd. Muell., accompanied by a letter from G. Bentham to Lindley :—'*Octoclinis* F. Muell. is probably not distinct from *Frenela* ; it is figured by him in the *Transactions of the Philosophical Society of Victoria*, which we have not here to give you the page and vol.'

Also a note by R. T. Baker, '*O. Macleayana* = *C. Macleayana*. This sp. and *C. Parlatorei* are identical ; the former was founded on the acicular leaf and 8-valved cone form of this tree. The 2nd are one and the same species, as fruits with both 6 and 8 valves occur on the same tree as found in the Bot. Gard. Hobart, and the acicular leaves are common to both. 19. viii. 04.'

WIDDRINGTONIA JUNIPEROIDES, *Endlicher, Syn. Conif.* 32 (1842).

A sterile specimen, with the long primordial leaves, labelled '*C. juniperoides*, Hort. Kew.'

ACTINOSTROBUS PYRAMIDALIS, *Miquel in Pl. Preiss.* 644 (1845).

A robust cone-bearing specimen rightly named; collected by Drummond at the Swan River in 1839.

FITZROYA PATAGONICA, *Hooker f. ex Lindley in Journ. Hort. Soc.* vi. (1851), 264.

A fine robust, sterile specimen, correctly identified, with a note :— 'Snow-line of Andes of Patagonia; Tree 80–100 ft. Lobb, 82.'

Two specimens showing the larger, more spreading leaves, the one sterile, the other cone-bearing, both received from J. Veitch. A letter from the latter dated Oct. 22, 1883, accompanies these, but contains little of interest.

LIBOCEDRUS CHILENSIS, *Endlicher, Syn. Conif.* 44 (1847).

Five specimens on one sheet, correctly identified, one cone-bearing, the remainder sterile, collected by Bridges in Chile.

Three specimens on one sheet, the two smaller collected by Bridges in Chile (No. 781), one of which bears cones; the third and larger sterile specimen, collected by Dombey (No. 938) in the same region, was communicated from the Paris Herbarium.

L. DECURRENS, *Torrey, Smithson. Contrib.* vi., 7, t. 3 (1854).

Two specimens on one sheet, the upper a fine cone-bearing specimen bearing also a profusion of male strobiles, labelled '*Thuya Craigiana*, No. 750, *Cupressus Jeffreyi*, Scotts River, on dry sandy soil. Lat. 41°, Oct. 29, 1852;' correctly identified by A. Henry. The remaining sterile specimen from California (Hartweg, 1972), correctly identified by Lindley.

Two envelopes containing twigs with the juvenile form of leaf from Peter Lawson & Sons, Nurserymen, Edinburgh, labelled 'No. 6, *Thuya gigantea*, Jeffreys; this looks very like No. 5; do you think them distinct?' and 'No. 4, *Th. gigantea*, Murray. Do you think this quite distinct from No. 3?' Nos. 3 and 5 have, however, not been found among Lindley's plants.

L. TETRAGONA, *Endlicher, Syn. Conif.* 44 (1847).

Two fine specimens on one sheet, the more robust, sterile, the smaller, cone-bearing; correctly identified and labelled 'Andes of Patagonia, snow-line, Lobb, 83. Arbor 50–80 ped.'

A very small specimen on a separate sheet bearing rudimentary cones, not identified, labelled 'H. C. Lambert, Capt. King.'

THUYOPSIS DOLABRATA, *Siebold and Zuccarini, Fl. Jap.* ii., 34, tt. 119, 120 (1842).

A robust sterile specimen correctly identified and labelled 'Mt. Hakone, 6000 ft., Japan.'

Another with cones from Japan, gathered by Fortune.

Another without cones from the same source, collected by Siebold, ex Herb. Zuccarini.

A cone-bearing specimen from Japan from J. Gould Veitch.

var. LAETE-VIRENS, *Masters in Jour. Soc. Linn.* (*Bot.*), xviii., 486 (1881).

A small sterile specimen from Yeddo, Japan, collected by Veitch (No. 464), labelled '*Thuyopsis sp.* A dwarf-growing plant; habit erect and bushy. Foliage of a very light green colour; cultivated.'

THUYA OCCIDENTALIS, *Linn., Sp. Pl.* 1002 (1753).

A cultivated cone-bearing specimen from Basing Park labelled '*Libocedrus Donniana*,' and correctly identified by Prof. A. Henry.

A large sterile specimen correctly identified and received from H. H. J.*

THUYA PLICATA, *D. Don in Lambert, Pinus*, 19 (1824).

A fine cone-bearing specimen labelled '*T. gigantea*, Oregon Boundary Commission, 1858–9,' from Vancouver Island, by Dr. Lyall.

Three cone-bearing specimens, two from N.W. America by Douglas, one from Monterey by Menzies, labelled '*Thuya plicata*.'

One cone-bearing specimen, correctly identified, from Oregon by W. Lobb (204); 'Evergreen tree, 50–80 ft. high.'

THUYA ORIENTALIS, *Linn., Sp. Pl.* 1002 (1753).

Two fruiting specimens on one sheet, one from Japan by Fortune labelled '*Thuya sp.*—a very ornamental tree,' and another labelled '178, *Thuya sp.* Shrub 12–15 ft. Habit dense and conical, probably *T. orientalis* of Siebold. Yokohama.'

A cultivated cone-bearing specimen from Swainson's Garden, 1826, labelled '*Thuya*.'

Cone-bearing specimen labelled '*Thuya sp.* Hills west of Peking —a large tree, 60 ft. Fortune, Oct. 1861.'

Two specimens, the one bearing male strobiles, the other immature cones, correctly identified, with an appended note bearing the number 6647, but otherwise difficult to decipher.

Two specimens, the sterile example by Veitch from Japan, labelled '*Thuya sp.* hills near Yokohama,' the cone-bearing from Fortune, labelled 'North of China, a tree 20–30 ft. high.'

One cone-bearing specimen labelled '*Thuya sp.* (Chefoo) China, Fortune, Oct. 1861.'

Another from the same collector identified as *Th. orientalis*, China, Fortune, 10.

A specimen with male strobiles and one very immature cone labelled '*Thuya occidentalis*, S. States, N. America, 1818.'

var. PENDULA,† *Masters in Journ. Roy. Hort. Soc.* xiv., 252.

A coloured plate from the *Botanical Register*, and a sterile specimen, the latter labelled '*Thuya filiformis*,' by Lindley, and by A. Henry as a form of *Thuya* (*Biota*) *orientalis*.

* Who H. H. J. represents I am unable to ascertain.

† Another sheet bears a twig of this variety, its type, and *Juniperus formosana*, Hayata, with an appended note stating that all were growing on one tree (grafted), Tien-tsin, Nov. 1861.

var. MEXICANA, *Dümmer in Gard. Chron.* (1913).

A small cone-bearing specimen determined and described by Lindley as *Chamaecyparis thurifera*, Endl., labelled 'Culta. Orizaba, Sept.' (Botteri).

THUYA JAPONICA, *Maximowicz in Bull. Acad. Petersb.* x. (1866), 490.

A small sterile specimen from Veitch (No. 449), labelled '*Thuya sp.*—a very pretty plant with pendulous habit. In foliage not unlike a *Thuyopsis*; cultivated, Yeddo.'

CUPRESSUS LAWSONIANA, *Murray in Edinb. New Phil. Journ.* i., 292, t. 10 (1855).

A specimen bearing a solitary cone, correctly identified, from California by Murray.

C. OBTUSA, *Koch, Dendrologie* II., ii., 168 (1873).

Three fruiting specimens, two labelled '415, *Retinospora sp.*; hills near Kanagawa, Japan, Veitch,' the other '*Retinospora obtusa*, Japan, Fortune.' A fruiting specimen labelled as the preceding, gathered by Veitch (No. 139) in Japan.

var. BREVIRAMEA, *Masters in Journ. Linn. Soc.* (*Bot.*), xxxi., 355 (1896).

A sterile specimen labelled '*Thuya sp.*,' collected by J. G. Veitch (No. 458) in gardens at Yeddo, Japan.

var. LYCOPODIOIDES, *Masters in Journ. Linn. Soc.* (*Bot.*) xxxi., 355 (1896).

A small sterile specimen labelled '*Retinospora lycopodioides*; Yeddo, cultivated.' Japan, Veitch.

var. AUREA, *Henry in Elwes and Henry, Trees of Gt. Brit. and Ireland*, v., 1187 (1909).

A large sterile specimen labelled '*Retinospora obtusa* var. *aurea variegata*; cultivated, Yeddo, Veitch, 341.'

C. PISIFERA, *Koch*, l.c. 170.

A sterile specimen labelled '*Retinospora sp.*; in the way of *R. obtusa*, but probably a distinct variety; Yokohama;' Japan, Veitch.

Three sterile specimens from Yokohama, Japan, by Veitch, two labelled 'J 543, *Thuya sp.* In habit very much resembles *Thuyopsis borealis*,' the other 'J 593, *Thuya sp.*'

Two specimens with an accompanying envelope of cones, labelled '*Retinospora, sp. nova*, hills near Kanagawa, Veitch, 440.'

Five specimens, three cone-bearing, labelled and from the same source as the preceding.

One cone-bearing specimen labelled '*Retinospora pisifera*; Japan, Fortune.'

A sterile specimen from Japan collected by Veitch (J. No. 8), labelled '*Thuya sp.*, cultivated.'

var. SQUARROSA, *Masters in Journ. Linn. Soc.* (*Bot.*) xxxi., 356 (1896).

Two sterile specimens labelled '*Juniperus sp.*, cultivated in gardens, Yeddo; Veitch,'

Two sterile specimens from the same locality and donor as preceding, labelled '*Retinospora sp.* Veitch, 419.'

var. PLUMOSA, *Masters*, l.c. 356.

A large sterile specimen labelled '*Thuya sp.*; cultivated, Yeddo, Veitch.'

C. NOOTKATENSIS, *Don in Lambert, Genus Pinus*, ii., 18 (1824).

A small sterile specimen labelled '*Thuyopsis borealis.*'

A small specimen with immature cones labelled '*Cup. Lawsoniana*' from Peter Lawson & Son, Nurserymen, Edinburgh.

Two specimens with immature cones labelled '*Chamaecyparis nutkaensis*, Edl.,' from Nootka, by Menzies.

C. THYOIDES, *Linnaeus, Sp. Pl.* ii., 1003 (1753).

Two sterile specimens: No. 1 from the Herbarium of Don; No. 2 —Dr. D. J. 1826, 32, 15, correctly named, and also labelled '*Chamaecyparis sphaeroidea*, Spach.'

var. VARIEGATA, *Endlicher, Syn. Conif.* 62 (1847).

Three cone-bearing specimens labelled '*Cup. sphaeroidea*, Hort.,' '*C. thyoides*, H. H. J.,' and '*Thuya sphaeroidea*, H. H. J.' respectively, and at the bottom of the sheet—'*Chamaecyparis sphaeroidea.*'

C. GOVENIANA, *Gordon, in Journ. Hort. Soc.* iv. 295, with fig. (1849).

Two specimens, one sterile, the other bearing unopened cones, correctly named; origin unknown.

C. MACNABIANA, *Murray in Edinb. New Phil. Journ.* i., 293, t. 11 (1855).

W. Murray's specimens (two, one cone-bearing), so-named, from California.

Two large sterile specimens collected by W. Lobb (No. 439) on the Sierra Nevada, N. California, labelled '*C. nivalis*, MSS. and *C. glandulosa*, W. Hook. MSS.'

C. FUNEBRIS, *Endlicher, Syn. Conif.* 38 (1847).

A sterile specimen with the following note:—'A specimen of one of the most beautiful trees in China, the same of which Mr. Fortune wrote to Dr. Lindley about in his letter of Dec. 15th, 48'; correctly named, and inferring that *C. pendula*, Staunt., is identical with it, which it is.

C. SEMPERVIRENS, *Linn., Sp. Pl.* 1002 (1753).

A small sterile specimen so named, collected by Elesmann in Southern Tyrol.

A large cone-bearing specimen labelled '*Cupr. expansa.*' Probably of garden origin.

A cone-bearing specimen named '*C. horizontalis*, Hort.'

A sterile specimen named '*C. Tournefortii*,' most likely also of garden origin.

C. LUSITANICA, *Miller, Gard. Dict.* No. 3 (1768).

A specimen bearing male strobiles, probably of garden origin, labelled '*C. pendula*, Herb. Don.'

A cone-bearing specimen without any indication as to origin; correctly named.

Two specimens, one sterile, the other cone-bearing, labelled '*C. Uhdeana*, H. H. J. 1849.'

One cone-bearing specimen similarly named, and from the same source as the preceding, but without date.

A sterile specimen labelled '*C. torulosa*, H. H. J.' (*C. torulosa*, Lindley, in Lindl. and Paxt. Fl. Gard. i., 167, p. 105 (1850), is referred to *C. macrocarpa*, Linn., but this specimen can scarcely be referred to the latter species.)

var. BENTHAMII, *Carrière, Conif.* 155 (1867).

A large specimen bearing male flowers and cones, collected by Graham (No. 322 B) in Mexico, labelled '*Cup. thurifera*, Kth. No! *C. Benthamii*, Endl., and *C. Lindleyi*, Klotzsch.'

Two specimens, both cone-bearing and labelled '*C. thurifera*, Schlecht.,' the one collected between Angauguco and Italpuxáhua, Sept., No. 230; the other from the 'Banco,' Jan.

C. TORULOSA, *Don, Prod. Fl. Nepal.* 55 (1825).

Two specimens, the sterile labelled '*Juniperus excelsa*, M.B.,' collected by T. Thomson in Kashmir at elevations of 6000–7000 ft.; the cone-bearing specimen by the same collector from Simla, 7000–8000 ft., correctly named.

Two specimens, one cone-bearing, collected by Wallich on the Himalayas (No. 6046), correctly named.

C. MACROCARPA, *Hartweg in Journ. Hort. Soc.* ii., 187 (1847).

Two sterile specimens so-named, doubtless of garden origin.

JUNIPERUS RECURVA, *Buchanan-Hamilton ex Don Prod. Fl. Nepal.* 55 (1825).

A sterile specimen labelled '*J. recurva*, H. H. J.'; no indication as to its origin.

Two specimens, the smaller in fruit, gathered by Wallich (No. 6043) in the Himalayas, labelled '*J. squarrosa*, B. Ham.; subsequently *J. rigida*, Wall.'

Five small specimens, three in fruit, collected by J. D. Hooker in Sikkim at 10,000–12,000 ft.; correctly named.

J. WALLICHIANA, *J. D. Hooker ex Parlatore in De Candolle, Prod.* xvi., ii., 482 (1868).

Two specimens, the larger in fruit, collected by Wallich (No. 6041) on the Himalayas, labelled '*J. excelsa*, Bieb. ? Hb. 1824.'

Five specimens, three in fruit, accompanied by a piece of bark, collected by T. Thomson and J. D. Hooker at Kishtwar 10,000–12,000 ft., and in Sikkim 10,000–15,000 ft. respectively.

J. SQUAMATA, *Buchanan-Hamilton in Lambert, Genus Pinus*, ii., 17 (1824).

Two sterile specimens collected by T. Thomson at Kishtwar, 12,000 ft. elevation, labelled '*J. recurva*, Ham. *B. squamata*.'

J. RELIGIOSA, *Carrière, Conif.* 41 (1855), not Royle.

Six small specimens, five sterile, one bearing male flowers, collected by T. Thomson in Western Thibet at 5000–15,000 ft. elevation, labelled '*J. excelsa*, M. Bieberst.'

J. CHINENSIS, *Linnaeus, Mant.* i., 127 (1767).

Three fruiting unnamed specimens showing only the scale-leaf phase, collected by Fortune in N. China, who states that the tree is 30–50 ft. high.

Two small scale-leaved specimens, one sterile, correctly named, from Fortune, China.

Two specimens with dimorphic leaves and male flowers, labelled '*J. excelsa*, H. H. J., China. Hort. Whitley, 1818.'

A fruiting scale-leaved specimen labelled '*Juniperus sp.* (glaucous-leaved)—a very ornamental tree, and sent to Glend, ——, Chekiang, Nov. 1854,' probably collected by J. G. Veitch.

Two scale-leaved fruiting specimens, the upper labelled '*Juniperus sp.*, N. China, 30–50 ft., Fortune'; the other, 'China, Fortune'; and in pencil, '*J. sinensis* (*cernua*, Roxb.); (*flagelliformis*).'

Four specimens showing both leaf phases, two in fruit, one sterile, the other bearing male flowers, labelled '*J. sinensis*, H. H. J. ♀ and ♂.'

Two sterile scale-leaved specimens collected by Veitch (Nos. 521 and 522) in Japan, labelled '*Juniperus sp.*, cultivated, Yeddo.'

Another of the same series and the same source, but without number.

A fruiting specimen labelled '*J. Smithii*, H. H. J.'

Specimens representing *J. sphaerica, Lindley, in Lindl. and Paxton's Fl. Gard.* i., 58, f. 35 (1850), are evidently not here; his type of that 'species,' according to Henry, is preserved in the British Museum.

J. PROCUMBENS, *Siebold in Ann. Soc. Hort. Pays-Bas* (1844), 31.

Two sterile specimens labelled '*Juniperus sp.*, Nagasaki, 1800, Veitch.'

J. SABINA, *Linnaeus, Sp. Pl.* 1039 (1753).

A sterile specimen with primordial leaves, correctly named, collected by Bourgeau in the Vallée des Ares, Aug. 23, 1858.

Two sparingly fruited specimens from Swainson's Garden, 1826.

A fruiting specimen from Dahuria, labelled '*J. dahurica*,' from Dr. Fischer.

var. TAMARISCIFOLIA, *Solander in Aiton, Hort. Kew.*, iii., 414 (1789).

A sterile specimen, correctly named, from H. H. J.

var. PROSTRATA, *Loudon, Arb. et Frut. Brit.* iv., 2499 (1838).

A small specimen bearing male strobiles, labelled '408; *Juniperus prostrata*, N. America.'

J. PHOENICEA, *Linnaeus*, l.c. 1040.

A small fruiting specimen labelled '*J. Sabina*, L., v. *excelsa*, Spach (*J. excelsa*, M. B.),' collected by Th. Kotschy (No. 711) at Kuh-Daëna, Jul. 1842.

Two fruiting specimens correctly named; Pont du Gard, December.

Two fruiting, probably cultivated, specimens, correctly named from H. H. J.

A fruiting specimen, ex Herb. Boissier, collected on the mountains near Dylar in 1837, named *J. Lycia*, L.

Five correctly named specimens, four in various stages of fruit, one sterile, from Naples. One fruiting specimen from Greece by Th. Kotschy (No. 154), Feb. 1836, two from Avignon, collected by W. J. Hooker, and the other from Algiers by N. Bové, April 1837.

J. OCCIDENTALIS, *W. J. Hooker, Fl. Bor. Amer.* ii., 166 (1839).

Two specimens, one male, collected by W. Murray in California; the other in fruit, collected by Jeffrey (No. 743) at the Clamath River, Lat. 43°, Oct. 25, 1852.

Two unnamed specimens, one with male strobiles, from New Mexico, collected by C. Wright (No. 1890) in 1851–52; the other in fruit, but its origin unknown.

J. FLACCIDA, *Schlechtendal in Linnaea*, xii., 405 (1838).

A fine fruiting specimen, so-named, collected at Regla, Dec.

A sterile specimen with an accompanying envelope of fruit, collected by Coulter (No. 1419) in Mexico, ex Herb. Collegii SS. Trin., Dublin.

J. OXYCEDRUS, *Linnaeus*, l.c. 1038.

Two fruiting specimens, the smaller unnamed and from Balaclava, the other labelled '*J. rufescens*, Link,' collected by Th. Kotschy (No. 411), on the mountains near Güllek, 3400–4500 ft., Aug. 1853.

Two fruiting specimens correctly named, from Montpellier, December. J. Stuart Mill.

Two correctly named male-flowering specimens from the Caucasus.

J. CEDRUS, *Webb and Berthelot, Hist. Nat. Isles Canar.*, iii., 277, t. 217 (1840).

Two fruiting specimens collected by E. Bourgeau (No. 1501) on the canadas of Teyde, Teneriffe. July, 1855.

J. MACROCARPA, *Sibthorp and Smith, Fl. Grace. Prod.*, ii., 203, (1813).

Four specimens, one bearing a solitary fruit, correctly identified, from H. H. J.

J. DRUPACEA, *Labillardière, Icon. Pl. Syr.*, ii., 14, t. 8 (1791).

Three specimens, one fruiting, collected by Kotschy (No. 408), between Güllek Boghas and Gosolugh Chan, 2000 ft. elevation, named *Arceuthos drupacea*, Antoine and Kotschy.

J. RIGIDA, *Siebold and Zuccarini, Fl. Jap.* ii., 56, t. 125 (1844).

A fruiting specimen so-named, from Japan; J. G. Veitch.

J. FORMOSANA, *Hayata in Journ. Coll. Sci., Tokyo*, xxv., art. 12, 209, pl. 38 (1908).

Two specimens, the sterile labelled 'Hort. Kew,' the fruiting, '*J. rigida*, S. and Z. Fortune, N. China.'

A peculiar form, tentatively named var. *Fortunei*, with large one-seeded fruit, collected by Fortune on the Chekiang hills near Ningpo. Dec. 1853.

J. COMMUNIS, *Linnaeus*, l.c. 1040.

Two specimens, one with immature fruit, the other bearing male strobiles, collected by T. Thomson on the Western Himalayas at 5000–11,000 ft.

Two sterile specimens collected by Wallich (No. 16043 A.) on the Himalayas, erroneously labelled '*J. squamosa*' and '*J. rigida*.'

An unnamed flowering male specimen without information as to origin.

One fruiting specimen from New Mexico, gathered by A. Fendler (No. 836) in 1847.

Three sterile specimens labelled '*J. oblonga*, H. H. J.'

One sterile specimen labelled 'China; Hort. Wills.'

var. NANA, *Loudon, Arb. et Frut. Brit.* iv., 2489 (1838).

A specimen from Swainson's Garden, Twickenham, 1826, labelled '*J. nana*.'

Five specimens, the three fruiting labelled '*J. dealbata*, D.D.,' collected by Douglas in Colombia, 1826; the remaining sterile are labelled '*J. lapponica*' and '*J. communis* v. *nana*; Iceland,' respectively.

Two sterile specimens without information as to origin.

var. SUECICA, *Aiton, Hort. Kew*, v., 414 (1813).

A specimen with male flowers, collected by A. F. Láng at Buda.

J. EXCELSA, *Bieberstein, Beschr. Länd. Casp.* 204, App. No. 72 (1800).

Eight fruiting specimens, correctly identified, collected by Th. Kotschy (No. 414) at Bulgar Dagh, 2000–6400 ft. Aug. 1853.

Four fruiting specimens from the same locality and collector, Nos. 412–413, labelled '*J. foetidissima*, Willd.'

Four fruiting specimens from an unknown source.

J. THURIFERA, *Linnaeus*, l.c. 1039.

A fruiting specimen from Montpellier by G. Bentham; another, sterile, from Swainson's Garden, 1826.

Two sterile specimens labelled '*J. alpina*, H. H. J.'

One sterile specimen labelled '*J. hispanica*, H. H. J.'

The poor material of the last two renders their identification only approximate.

J. PYRIFORMIS, *Murray in Gard. Chron.* (1855), 420.

Two specimens, one scale-leaved and in fruit, the other sterile and showing both leaf-forms, labelled '*J. pyriformis*, in *Gard. Chron.*, June, 1855,' collected by W. Lobb (No. 435) on St. Barnardino Mountain in California, where it grows, according to the collector, to a height of 10–12 ft.

Two specimens, both sterile, the smaller with acicular leaves, the other scale-leaved, accompanied by a packet of fruit, named as the preceding and inferring that they are identical with *J. californica* of Carrière.

J. VIRGINIANA, *Linnaeus*, l.c. 1039.

A large specimen with male strobiles, correctly named, probably

of garden origin. A poorly fruiting specimen, labelled '*Juniperus sp.*', collected by Jeffrey (No. 471), Apr. 1852, at Bellevue Island.

A small specimen with immature fruit, collected by Drummond (No. 323) in New Orleans. A small fruiting specimen, 'Canada, Pithkethly, *J. Sabina*.' Two freely fruiting specimens correctly named besides *J. Sabina*, Linn., Palliser's Brit. N. Amer. Expl. Expedition, Saskatchewan; coll. E. Bourgeau, 1851–8.

var. GLAUCA, *Knight, Syn. Conif.* 12 (1850).

Three sparingly fruited specimens, correctly identified, of garden origin.

J. SCOPULORUM, *Sargent in Garden and Forest*, x., 420, f. 54 (1897).

Two sterile acicular-leaved specimens, labelled '*J. occidentalis*, H. H. J.,' of garden origin.

Two unnamed specimens, one bearing fruit, the other male strobiles, collected by A. Fendler in New Mexico, 1847, numbered 835 and 835 b. respectively.

J. MEXICANA, *Schiede in Linnaea*, v. (1830), 77; not Sprengel.

A large fertile specimen, correctly identified, with the following note:—'A tree or mostly a shrub; 10–15 ft. high; Real del Monte, Jan. This yields sandarach in Mexico, T. H.'

J. TETRAGONA, *Schlechtendal in Linnaea*, xii., 495 (1838).

Two large fruiting specimens, one so-named, the other *J. glauca*, Bentham; the former collected on the road from Real del Monte to Chico in January; the latter in Mexico by Graham.

One large fruiting specimen, collected by Graham (No. 320 B.) in Mexico, named *J. mexicana*, Spreng. (*Cupr. subnioides*, Kth.).

J. MONOSPERMA, *Sargent, Silva North Amer.* x. (1896), 89, t. DXXII.

A small unidentified specimen collected by Douglas in 1826 on the ascent to the Columbia River.

J. CALIFORNICA, *Carrière, Rev. Hort.* (1854), 352, f. 21.

A small fruiting specimen, labelled '*Juniperus sp.* No. 1475; summit of Sierra Nevada Mountains. Sept. 25, 1853.' A large specimen with male strobiles collected by A. Fendler (No. 834) in New Mexico in 1847, labelled '(Shrub Cedar, Engelmann).'

CRYPTOMERIA JAPONICA, *Don, in Trans. Linn. Soc. Bot.* xviii., 167, t. xiii., i. (1839).

A cone-bearing specimen without information as to its origin.

Two cone-bearing specimens, the one from the Herbarium of Zuccarini and collected by Siebold in Japan, the other from Fortune in 1845 (a 16), and labelled 'a handsome tree, Shanghai and North of China, Oct. 1843.'

Three sterile specimens from Nagasaki, collected by Veitch, 1860.

var. ELEGANS, *Masters in Journ. Linn. Soc.* (*Bot.*) xviii., 497 (1881).

A sterile specimen from Veitch (No. 77), labelled—'*Cryptomeria sp.* Glaucous foliage; habit somewhat pendulous; cultivated, Nagasaki and Yeddo.'

GLYPTOSTROBUS HETEROPHYLLUS, *Endlicher, Syn. Conif.* 70 (1847).

A fruiting specimen with dimorphic leaves, labelled ' Water Pine ; Foochow-foo, Oct. 1850.'

Another showing a similar foliar phase, labelled ' R. Fortune, No. a 160, 1845, Water-pine, Canton, China.'

TAXODIUM DISTICHUM, *Richard in Ann. Mus. Paris*, xvi. (1810), 298.

Leafless ♂ flowering specimens from the Bot. Gardens of Naples, March, 1827.

Two leafy specimens with ♀ flowers and immature cones from Texas, labelled ' Close to the edge of the water on rivers, July ; to 120 ft. high ' ; (collector not stated).

Two specimens, both in leaf, the one sterile, the other with immature cones, doubtfully of the same origin, labelled ' Mexico, Graham, 318 B.'

Two large leafy cone-bearing specimens, labelled ' *T. distichum*, H. H. J.'

var. IMBRICARIA, *Sargent, Silva North Amer.* x., 152 (1896).

Two leafy and cone-bearing specimens from Chapultepec, by Roezl.

SEQUOIA SEMPERVIRENS, *Endlicher, Syn. Conif.* 198 (1847).

Two specimens with male strobiles, accompanied by an envelope containing male strobiles and a cone, labelled ' *Taxodium sempervirens*, H. H. J.,' and correctly identified by A. Henry.

An unnamed cone-bearing specimen labelled ' 1974, California, Hartweg.'

S. GIGANTEA, *Decaisne in Bull. Bot. Soc. France*, i., 70 (1854).

Two large sterile specimens accompanied by cone-scales labelled ' *Wellingtonia gigantea*, 436, N. California, W. Lobb.'

ATHROTAXIS SELAGINOIDES, *Don in Trans. Linn. Soc.* (*Bot.*) xviii., 172, t. 14 (1839).

Four fruiting specimens collected by Gunn (No. 368) in Tasmania ; correctly identified.

A. CUPRESSOIDES, *Don*, l. c. 173, t. 13, f. 2.

A sterile specimen collected by Gunn (No. 365) in Tasmania ; correctly identified. A small cone-bearing specimen by McHenty from the same locality. Two fertile specimens labelled ' $\frac{365}{1842}$ Marlborough, 17, x., 40.'

A. LAXIFOLIA, *W. J. Hooker, Icon. Pl.*, t. 573 (1843).

Three specimens, one cone-bearing, from the Meander River, Tasmania, Gunn, 369, one labelled ' *A. cupressoides*.'

Two small cone-bearing examples from the same island by McHenty.

CEPHALOTAXUS FORTUNI, *W. J. Hooker in Bot. Mag.*, t. 4499 (1850).

Two specimens with female flowers collected by R. Fortune (No. a 111) in the North of China and Chusan, Oct. 1845 and Oct. 1853.

Two specimens bearing male flowers; N. China. Fortune—'a very ornamental tree, 10–20 ft. high.'

One female specimen with an appended note:—'*Cephalotaxus sp.* (male and female sp.); called the female sp. of *C. Fortunei*, but a distinct sp. N. China. Oct. 1858. (Fortune.)'

C. DRUPACEA, *Siebold and Zuccarini. Fl. Jap. Fam. Nat.* ii., 108 (1846).

A male specimen on the same sheet as the preceding specimen. A female specimen collected by J. G. Gould in Japan.

C. PEDUNCULATA, *Siebold and Zuccarini*, l. c. 108.

A fruiting specimen collected by C. Wilford in 1859 on the Island of Tsu-sima, St. of Corea; ex Herb. Roy. Gd. Kew., labelled '*C. drupacea*, S. and Z.'

A large female specimen from Veitch (No. J. 99), Japan, labelled '*C. drupacea*.'

TAXUS BACCATA, *Linnaeus, Sp. Pl.* 1040 (1753).

Kotschy's specimens (No. 422) with immature fruit, from the mountains near Bulgar Dagh.

Two specimens of unknown origin, the one sterile the other with male strobiles.

sub. sp. WALLICHIANA, *Pilger in Engler, Pflanzenreich*, iv., 5, 112 (1903).

Three of Wallich's specimens (Nos. 6054 and 6054 B.), one bearing male strobiles; one fruiting, the other sterile.

One fungus-infested sterile specimen from Sikkim, 7000–10,000 ft., collected by J. D. Hooker. One fruit-bearing, from the Western Himalayas, 8000 ft., by T. Thomson.

Two specimens, the larger sterile, the other bearing one fruit, both from Khasia, 5000–6000 ft., collected by J. H. Hooker and T. Thomson.

A large specimen bearing male strobiles collected by Wallich (No. 6054), labelled '*Taxus cingata*, Wall.'

var. FASTIGIATA, *Loudon, Arb. et Frut. Brit.* iv., 2066 (1838).

A specimen bearing male strobiles, labelled '*Taxus fastigiata*, Hort. Sabine, May, 1820.'

var. BREVIFOLIA, *Henry in Elwes and Henry, Trees of Gt. Britain and Ireland*, i., 100 (1906).

A sterile specimen with several immature fruits enclosed in an envelope, labelled '*Taxus californica*, California, W. Murray,' in ink, and in pencil, '*T. Lindleyana*, A. Murray.'

A sterile specimen labelled '210 Oregon. W. Lobb: 15 ft. high,' in ink, and '*T. canadensis*' in pencil.

A specimen bearing male strobiles collected by Douglas in N. W. America and labelled in pencil, '*Taxus Lindleyana*' A. Murray.'

A fruit-bearing specimen collected by Lobb (461).

var. GLOBOSA, *Henry*, l. c. 101.

A large sterile specimen accompanied by two immature fruits enclosed in an envelope, labelled '230. Coniferae. *Taxus baccata* (*globosa*, Schlecht), Nov. Guajolote.'

T. CUSPIDATA, *Siebold and Zuccarini, Flor. Jap. Fam. Nat.* ii., 108 (1846).

Cotype bearing male strobiles collected by Siebold in Japan; ex Herb. Zuccarini. A fruit-bearing specimen with rather narrower, more falcate leaves, labelled '426, *Taxus cuspidata*; small tree, 10–12 ft., Mt. Hakoni,' is probably a form of this species.

TORREYA NUCIFERA, *Siebold and Zuccarini in Abh. Akad. Muenchen*, iv., 3, p. 234 (1846).

Siebold's Japanese specimen with male strobiles, ex Herb. Zuccarini, Hort. Monac. Two sterile specimens from J. G. Veitch, Japan, accompanied by an envelope containing some fruit sections.

A sterile specimen labelled '*Podocarpus nucifera*, J. 98, Kanagawa.'

T. GRANDIS, *Fortune in Gard. Chron.* (1857), 788, and (1860), 170.

Fortune's specimens with immature fruit, from the Chekiang Mountains; of the tree he states that it is a noble evergreen, known as 'Fee-shee.'

The specimens are accompanied by three pen-and-ink sketches of Lindley's depicting the general outline, a transverse and longitudinal section respectively of the bud.

T. CALIFORNICA, *Torrey in New York Journ. Pharm.* iii., 49 (1854).

Three specimens labelled '*T. Myristica*, Hook.,' the larger and sterile specimen from the 'Sierra Nevada, N. California, 5000 ft. Evergreen tree, 40–50 ft. high. No. 207 (collector ?); wood yellow.'

The two smaller specimens, with female flowers, are ascribed to W. Lobb (No. 221).

GINKGO BILOBA, *Linnaeus, Mant.* ii., 313 (1771).

Two small male-flowering specimens, labelled '*Salisburia adiantifolia*, received from De Candolle. Accompanying the specimens is a separate pen-and-ink sketch dated Sept. 1855, depicting the germination of the seeds.

PHYLLOCLADUS RHOMBOIDALIS, *Richard, Conif.* 130, t. 3, f. 2 (1826).

Two immature fruiting specimens, correctly identified, collected by R. Gunn (No. 327) in Tasmania.

Two specimens, the one fruiting, labelled '*Phyllocladus sp.*; handsome tree with shining glaucous leaves, 10–30 ft. high, 8000 ft. and upwards.' No indication of the collector or locality.

P. HYPOPHYLLUS, *Hooker f. in Hook. Icon. Pl.* (1852), t. 889.

Three specimens, two of which bear male strobiles, labelled '*Phyllocladus*; Kina Balon, 10,000 ft.' No indication as to locality or the collector.

P. TRICHOMANOIDES, *D. Don in Lamb. Pin.* ed. ii., App.

Three specimens and a seedling, all sterile. The largest from New Zealand by Bidwell (No. 11), 1839, with an appended note:—'*P.*

trichomanoides?—is this the same as Cunningham's plant? It is called Tanaiwai, while the other is called Tanekata; they look very different, but I have no specimen of the Tanekata to send.'

The remaining specimens were collected by J. D. Hooker and identified by him as *P. trichomanoides*.

P. ALPINUS, *Hooker f. Fl. New Zeal.* i., 235, t. 53 (1853).

Four fruiting specimens from Bidwell (No. 12); 1839, New Zealand. The appended note reads, '*Phyllocladus sp. nova*. A tree 15 ft. high, growing on Tongadido at an elevation of more than 8000 ft.; very rare. The plant is not of a much brighter colour when fresh than the dried specimens.'

DACRYDIUM CUPRESSINUM, *Solander ex Forster, Pl. Esculent*, 80 (1786).

Three fruiting specimens by Menzies (No. 331) from the North Island, New Zealand, 1838, labelled '*Dacrydium excelsum*, Don.'

Two correctly named sterile specimens from the same source (No. 332) showing the primordial leaf-stage; Sept.

Three sterile specimens from New Zealand, one by Bidwell (No. 3), 1839; the remainder collected by J. D. Hooker and exhibiting various leaf-phases.

D. FRANKLINII, *Hooker f. in Hook. Lond. Journ. Bot.* iv. (1845), 152, t. 6.

A sterile specimen correctly identified, labelled 'Huon Pine, Tasmania, Gunn, 1248.'

D. LAXIFOLIUM, *Hooker f. in Hook. Lond. Journ. Bot.* iv. (1845), 143.

Two fruiting specimens, the smaller collected by Bidwell in New Zealand and identified by Hooker; the larger also by Bidwell (No. 5) in 1839, with a note:—'*Dacrydium*; the dried specimens give an exact representation of the habit of this plant, which I may be excused for mistaking for a clump of moss when I first saw it on the tops of the bleak mountains. Its colour (reddish bronze) was exactly that most common to the mosses, with which it grew. The berries were very beautiful, of a purplish red and about half the size of those of the Yew. I think the plant is hermaphrodite, as I never found one of any size without berries, although some were covered, while the others had but one or two on the whole plant; they were very good to eat.'

D. INTERMEDIUM, *T. Kirk in Trans. N.Z. Inst.* x. (1878), 386, t. 20.

A sterile specimen collected by Menzies in New Zealand; the identification can only be approximately correct in view of the absence of flowers or fruit.

D. GIBBSIAE, *Stapf ex Gibbs in Ann. Bot.* xxvi., 525 (1912) *nomen*.

Two sterile specimens labelled '*Dacrydium sp.*, small tree with pendulous branches while young; 8000 ft. Borneo, Lowe.'

Two larger sterile specimens, labelled '*Dacrydium*, 8000–10,000 ft. on Kina Balon; branchlets also pendulous; a stunted tree.'

D. ELATUM, *Wallich ex Hooker, Fl. Brit. India*, v., 648 (1890).

Wallich's fruiting specimen labelled '6045—*Dacrydium elatum*, Wall. *Juniperus elata*, Roxb. Penang, 1822, et Jack 1819. (*J. Phillipsiana*, Wall. in Herb. 1824.)'

A small specimen with male strobiles collected by Griffith on Mount Ophir.

D. BIDWILLII, *Hooker f. ex T. Kirk in Trans. N.Z. Inst.* x. (1878), 388.

Bidwell's two sterile specimens (No. 2) from New Zealand, 1839, with an appended note :—'Can this be the same as *Dacrydium excelsum* ? the natives called it by the same name, but they grow at great distances from one another ; this was at an elevation of more than 7500 ft. ; it was a solitary small tree.' Superficially not unlike *D. Franklinii*, but that is confined to Tasmania.

MICROCACHRYS TETRAGONA, *Hooker f. in Hook. Lond. Journ. Bot.* iv. (1845), 150.

Three specimens, two male, one apparently female, labelled '366 and 367, V. D. Ld. (Tasmania), Gunn ; *Dacrydium depressum*, Don.' Two sterile specimens, mixed with specimens of the following.

PHAEROSPHAERA HOOKERIANA, *Archer in Hook. Kew Journ.* ii., 5 2 (1850), partly.

One large female and two small male specimens with an accompanying envelope containing fragments of the latter sex, labelled '366, Lake St. Clair, Tasmania, Gunn,' erroneously referred to the preceding genus.

SAXEGOTHAEA CONSPICUA, *Lindley in Journ. Hort. Soc. Lond.* vi., 258, figs. A and B (1851).

A large specimen bearing both sexes, labelled 'Patagonia, Andes, Lobb' ; '*Saxe-Gothaea conspicua*.' An immature cone and some wood-splints are included in an accompanying envelope, besides two papers with ink sketches of the sexes of the species.

PODOCARPUS DACRYDIOIDES, *A. Richard, Fl. Nuov. Zel.* 358, t. 39 (1832).

Two fruiting specimens gathered by Bidwell (No. 1) in 1839 in New Zealand, labelled '*Dacrydium excelsum*, in rich lands only ; 150 ft. high.'

Four specimens showing both sexes and also the fruiting stage, gathered by A. Cunningham in 1826, labelled '*Dacrydium excelsum*, Don ; Hokianga, New Zealand.'

The two preceding sheets were included in the *Dacrydium* genus cover.

P. NIVALIS, *Hooker f., Icones Pl.* vi., t. 582 (1843).

Three undetermined female specimens, collected by Bidwell (No. 4) in New Zealand in 1839 at an elevation of 4000 ft.

P. ALPINUS, *R. Brown ex Mirbel in Mém. Mus. Paris*, xiii. (1825), 75.

Four specimens with male strobiles collected by Gunn (No. 226) in Tasmania, one representing the stunted short-leaved alpine form, the remainder the longer-leaved lowland form.

P. SPICATUS, *R. Brown in Benn. Pl. Jav. Rat.* 40 (1802–18).

Four specimens, two with male strobiles, one sterile and the other bearing immature fruit.

One male and one sterile collected by J. D. Hooker in New Zealand and correctly identified. The specimen with immature fruit is labelled '*Dacrydium?* Mai. A. C. (A. Cunningham), New Zealand, Northern Isle, 1826.' The remaining accompanied by two labels, reading 'Mai Cunningham. I never saw the female plant'; and 'New Zealand, 10, Mr. Bidwell, 1839,' respectively.

P. TOTARA, *G. Benn. ex D. Don in Lambert, Pinus*, ed. ii. (1832), 189.

A specimen bearing immature fruit, labelled '*Podocarpus?* Totarra. Cunningham'; from New Zealand by Bidwell (No. 6), 1839.

Two leaf-forms, both bearing fruit, collected by J. D. Hooker in New Zealand, and labelled, '*Podocarpus Totarra*, A. C.'

A scale-infested fruit-bearing specimen collected by Bidwell (No. 7), 1839, and labelled as the preceding specimens.

Three specimens: two, male and female respectively, collected by A. Cunningham, labelled '*Podocarpus Totarra*, Don. Wangawa, New Zealand, 1826, A. C.' The third bears immature fruit and is similarly named and labelled 'No. 328, North Island, New Zealand, 1838.' Accompanying this sheet is a sterile specimen bearing sub-opposite linear-oblong obtuse leaves up to 3 in. long, which may be a Podocarp, but in its condition is further indeterminable.

P. FERRUGINEUS, *G. Benn. ex D. Don in Lambert, Gen. Pinus*, ed. ii. (1832), 189.

Three specimens, the larger fruiting, collected by J. D. Hooker in New Zealand, correctly identified by him; the two smaller bear male strobiles and fruit respectively; Bidwell (No. 9) is from the same region, 1839.

P. SPINULOSUS, *R. Brown ex Mirbel, Geogr. Conif. in Mém. Mus.* xiii. (1825), 75.

Three specimens, two male, one female, labelled '*Podocarpus pungens*, Lamb. Port Jackson, N.S. Wales. 1804, Caley.'

P. NERIIFOLIUS, *Don in Lamb. Gen. Pinus*, ed. i. (1824), 21.

A sterile specimen collected by T. Thomson in Sikkim at 3000 ft., labelled '*P. macrophylla*, Wall.'

A sterile specimen by Wallich (No. 6052), similarly named.

Two sterile specimens collected by J. D. Hooker and T. Thomson in Khasia, 2000–3000 ft. elevation, labelled like the preceding two, '*P. macrophylla*, Wall.'

Two specimens, one fruit-bearing, labelled '*Podocarpus sp.* Hab. Island Aniteum, New Hebrides; a low-sized tree, very similar in appearance to *P. spinulosus* and perhaps not distinct from that species. C. Moore (No. 6).'

P. POLYSTACHYUS, *R. Brown ex Mirbel in Mém. Mus.* xiii., (1825), 75.

A specimen with immature fruit collected by Wallich (6052 B.); on the same sheet as the preceding specimens of Hooker and Thomson.

P. WALLICHIANUS, *C. Presl. Bot. Bemerk.* (1844), 110.

One sterile and one male specimen collected by Wallich (No. 6050), and labelled '*Podocarpus latifolia*, Wall. Mt. Sillet.'

P. MACROPHYLLUS, *Don*, subsp. MAKI, *Siebold Naaml.* (1844), 35.

Wallich's specimen bearing male strobiles, labelled '*Podocarpus chinensis*, Wallich. No. 6051.' This specimen is stated by Pilger (*Engler, Pflanzenreich*, iv., 5, 80 (1903)) to represent this sub-species, but its Indian origin suggests it to be a form of the variable *P. neriifolia*, Don.

P. SALIGNUS, *D. Don in Lambert, Gen. Pinus*, ii. (1824), 20.

Two specimens named *P. chilina*, Rich., with immature fruit, the one collected by Bridges (No. 737) in Chile, the other and larger by Dombey (No. 937) in Peru.

P. LAMBERTII, *Klotzsch ex Endlicher, Syn. Conif.* (1847), 211.

Three specimens, one male, one female, and a sterile specimen, collected by Sellow in Brazil, correctly named; ex Herb. Reg. Berolinense.

P. GLOMERATUS, *Don in Lambert, Gen. Pinus*, ed. i. (1824), ii., 21.

A fruiting specimen, collected by R. Spruce (No. 5519) on the Andes of Ecuador, 1857–9.

P. PARLATOREI, *Pilger in Engler, Pflanzenreich*, iv., 5, 86 (1903).

A male specimen collected by Bridges in Bolivia in 1846.

P. NUBIGENUS, *Lindley in Paxton, Flow. Garden* (1851–52), ii., 162, f. 218.

A large fruiting specimen, so-named, labelled 'Andes of Patagonia, Lobb.'

P. SELLOWII, *Klotzsch ex Endlicher, Syn. Conif.* (1847), 209.

An immature fruiting specimen so-named, collected by Sellow in Brazil; ex Herb. Reg. Berolinense. The larger-leaved specimen above, with male strobiles, probably belongs to the same species, as is evinced by the thickish triangular bracts which subtend the male strobiles.

P. CORIACEUS, *L. C. Richard in Ann. Mus.* xvi. (1810), 297.

Two sterile specimens, so-named, and labelled 'Trinidad, Don, II, 54.'

A freely fruiting specimen, so-named, collected by Roezl in Mexico.

P. IMBRICATUS, *Blume, Enum. Pl. Javae* (1827), 89.

One seedling and two sterile specimens, the latter showing both the primordial and adult leaf-phase, collected by Cuming (No. 803) on the Philippines, and labelled '*Dacrydium*.'

An unnamed large sterile specimen with the accompanying note:— 'I discovered this plant growing in a dense forest in the island of Aniteum, New Hebrides, but none of its fruit could be obtained. I am consequently unable to refer it to any genus; it has a spreading habit, with the branches tapering to a fine point, inclining downwards. C. Moore, No. 5.'

P. BREVIFOLIUS, *Foxworthy in Philippine Journ. Sc.* vi., 160, t. xxix., f. 2 (1911); *P. neriifolius*, Don, var. *brevifolius*, Stapf., in *Trans. Linn. Soc. Bot.* iv. (1894), 249.

A small fruiting specimen labelled '*Podocarpus*, 12,000 ft. Kina Balon,' probably collected by Moore.

P. ELONGATUS, *L'Her. ex Pers., Syn. Conif.* ii. (1807) 580.

Three specimens, two sterile, one fruiting, correctly named, collected by Mundt and Maire at the Cape; ex Herb. Reg. Berol.

One sterile specimen from the same source.

P. LATIFOLIUS, *R. Br. ex Mirbel, Geogr. Conif. in Mém. Mus. Paris*, xiii. (1825), 75.

A sterile specimen, named *P. macrophyllus*, from the same collectors and same source as the preceding.

P. NAGI, *Pilger*, l. c. 60. (*P. Nageia*, R. Brown, l. c. 75.)

A fruiting specimen gathered by Veitch in Japan, labelled '*Podocarpus Nageia*, R. Br. 285. *Dammara sp.* Foliage similar to *D. Brownii* but lighter. Yeddo.'

P. ANDINUS, *Poeppig ex Endl., Syn. Conif.* (1847) 219 (*Prumnopitys elegans*, Phil. in Linnaea, xxx. (1860), 731).

A large male specimen collected by Dombey (No. 936) in Peru, labelled '*Juniperus*. Ex Herb. Mus. Paris.'

A smaller specimen (♂) named '*Prumnopitys elegans*, Phil. River Traiguen, in the province of Valdivia.' Accompanying this specimen are two fruits forwarded by Veitch.

A male specimen collected by Funck and Schlim (1538) in the Province of Merida, Venezuela, at 7000 ft. elevation, in 1847. Fl. April. Received from J. Linden.

CUNNINGHAMIA SINENSIS, *R. Brown in Richard, Conif.* 80, t. 18, f. 3 (1826).

A cone-bearing specimen by Fortune, labelled '*C. lanceolata*, Chekiang, China.'

A large specimen with male strobiles, labelled 'Hort. Lambert, 1820'; and a very small fruiting specimen, labelled 'China, Reeves.'

AGATHIS OVATA, *Warburg, Monsunia*, 186 (1900); *Dammara ovata*, C. Moore, ex Gordon, Pinet. Suppl. 28 (1862).

Two sterile specimens accompanied by three cone-scales and two seeds, labelled '*Dammara ovata*'; New Caledonia, Young and Moore.

A sterile specimen labelled '*D. obtusa*, Lindley; New Hebrides and Fiji Islands, C. Moore.'

AGATHIS MOOREI, *Masters, Kew Handl. Conif.* 59 (1896). *D. Moorei*, Lindley in *Journ. Hort. Soc.* vi. (1851), 271.

Three sterile specimens so named with an accompanying note:—'*Dammara sp.* Hab. Island of New Caledonia. In habit and appearance very unlike any other Dammara, and by far the most elegant of the genus, and of much smaller size, seldom above 40 ft. high; it has an erect compact growth, yet withal graceful—in a range of country of some miles extent, where it grows sparingly, not a cone could be discovered, but from information derived from an English settler it produces a smaller-sized cone than *D. australis*.' C. Moore, No. 8.

A cone was subsequently received by Lindley from the Botanical Gardens, Sydney, N.S.W., which is preserved in the Cambridge Museum, Case No. xxvi., Specimen No. 2840.

AGATHIS OBTUSA, *Morrison in Gard. Chron.* xxi. (1897) 300, ff. 102–103; *D. obtusa*, Lindley, l. c. 270.

One large sterile specimen so-named and accompanied by the following note:—'*Dammara sp.*, Hab. Island of Aniteum, New Hebrides. A plant similar in appearance to the New Zealand Kauri, but the size and shape of the leaves and cones will at once distinguish it from that species; it grows to a great size and produces a valuable timber, which is now used for ships, etc.' C. Moore, No. 7.'

AGATHIS MACROPHYLLA, *Warburg, Monsunia*, 186 (1900); *D. macrophylla*, Lindley, in *Journ. Hort. Soc.* vi. (1851), 271.

A large sterile specimen so named with an accompanying note:—'*Dammara sp.*, Hab. Island Vanicolla, Queen Charlotte Group; allied to the Kauri of Amboyna, but with larger cones and leaves; a noble-looking tree, somewhat rigid in habit yet with wide-spreading branches; some of the trees were at least 100 ft. high.' C. Moore, No. 9.

The cone ♀ is preserved in the Cambridge Museum, Case No. xxvi., Spec. No. 2841.

A. ROBUSTA, Bailey, *Cat. Woods Queensl.* (*Lond. Col. Ind. Exhib.*) (1886), 83. *D. robusta*, C. Moore ex F. Mueller in *Trans. Pharm. Soc. Vict.* ii. (1860), 174.

A large sterile specimen so-named, with four cone-scales and seeds from N.S. Wales. C. Moore.

A. PHILIPPINENSIS, *Warburg, Monsunia*, i., 185, t. viii., f. E. (1900).

Four specimens named *Dammara alba*, Lam., of which three bear immature cones, collected by Cuming (No. 906) on the Philippine Islands.

A. LORANTHIFOLIA, *Salisbury in Trans. Linn. Soc.* viii. (1807), 312, t. 15.

A sterile specimen collected by Wallich (No. 6057) in Amboyna, and named by him '*Agathis loranthifolia*, Salisb.'

ARAUCARIA BRAZILIANA, *A. Richard in Dict. Class. Hist. Nat.* i., 512.

Two sterile specimens collected by Sellow in Brazil, labelled '*A. braziliana*, Lamb., Herb. Reg. Berolinense.'

A sterile specimen collected by Dombey (No. 939) in Peru, labelled '*Araucaria Chilensis*, ex Herb. Mus. Paris.'

A. EXCELSA, *R. Brown, in Aiton, Hort. Kew.* ed. ii., v., 412 (1813).

A specimen with four rather small cone-scales; correctly named and received from H. H. J.

A. COOKII, *R. Brown ex Don in Trans. Linn. Soc.* xviii. (1841), 164.

Two unnamed twigs bearing male strobiles, accompanied by one cone-scale.

A. CUNNINGHAMII, *Sweet, Hort. Brit.* ed. ii., 475 (1830).

A sterile leafy branch, labelled 'No. 29, *Araucaria*; Islands of Aniteum, N. Hebrides, and N. Caledonia.'

SCIADOPITYS VERTICILLATA, *Siebold and Zuccarini, Fl. Jap.* ii., i., t. 101, 102 (1841).

A specimen with male strobiles gathered by Fortune in Japan.

A large sterile specimen from Japan, undoubtedly collected by Veitch.

A large specimen, accompanied by cone-scales, collected by J. G. Veitch in Japan.

PINUS EDULIS, *Engelmann in Wislizenus, Tour. Mexico, Bot. App.* 88. (1848).

A cone-bearing specimen, not identified, from Engelmann.

Two specimens, the smaller bearing male strobiles, the other sterile, collected by A. Fendler (No. 830) in New Mexico in 1847, labelled '*P. Fremontiana* (Nut Pine, Engelmann).'

P. PONDEROSA, *Lawson, Agric. Man.*, 354 (1836).

A sterile specimen from N.W. America by Douglas, correctly identified.

var. SCOPULORUM, *Engelmann in Brewer and Watson, Bot. Calif.* ii., 126 (1886).

A sterile specimen collected by C. Wright (No. 1886) in New Mexico, 1851–52. A specimen * with one cone from the same source and collector (No. 1887).

P. JEFFREYI, *Balfour, Bot. Exped. Oregon*, 2, fig. (1853).

A large sterile specimen collected by A. Fendler (No. 831) in New Mexico in 1847, labelled '*P. brachyptera*, Engelm.'

A sterile specimen correctly identified and collected by Jeffrey (No. 731) in the Chastey Valley, Lat. 41° 30′. Oct. 24, 1851.

P. VIRGINIANA, *Miller, Dict.*, ed. 8, No. 9 (1768).

A small cone-bearing specimen, labelled '*P. intermedia*, Hort. Anzl.,' and '*P. inops*.'

P. COULTERI, *Don in Trans. Linn. Soc.* xvii., 440 (1836).

A sterile specimen, accompanied by five separate male strobiles, labelled '*P. macrocarpa*.' (Lindley in *Bot. Reg.* xxvi., *App.* 61 (1840).)

P. TORREYANA, *Parry ex Torrey in Emory, Bot. Mex. Bound. Exp.* 210, tt. 58 and 59 (1858).

Two sterile specimens, correctly identified, collected by Jeffrey (No. 149) in Oregon.

Three leaf-bundles with an envelope containing a seed-wing, labelled '*P. lophosperma*, Gard. Chron. 1860' (Lindley in *Gard. Chron.* 1860, 46).

P. TEOCOTE, *Schlechtendal and Chamisso in Linnaea*, v., 76 (1830).

A small cone-bearing specimen, not identified, collected by C. Wright in New Mexico (No. 1887) in 1851–52.

var. MACROCARPA, *Shaw, Pines of Mexico*, 17, t. x. (1909).

A specimen * bearing male strobiles labelled '*P. Grahami*, Benth.,' and in pencil '*P. apuliensis*'; Mexico, Graham, 324 B.

P. TUBERCULATA, *Gordon in Journ. Hort. Soc.* iv., 218 (1849).

A specimen with a pseudo-whorl of three immature cones, labelled

* The Pines marked with an asterisk have been identified by Miss J. Clark, B.Sc., of Kew.

'*P. tuberculata*,' collected by Jeffrey (No. 705) on the Salmon River Mts., Lat. 41°, Oct. 1, 1852.

P. PSEUDOSTROBUS, *Lindley in Bot. Reg.* xxv., Misc. 63 (1839).

A sterile specimen, not identified, labelled '309, Septemb. 1882.'

P. PATULA, *Schlechtendal and Chamisso in Linnaea*, vi., 354 (1831).

A sterile specimen labelled '*P. patula*, interim,' collected by Deppe in Mexico, Nov. 28.

P. RIGIDA, *Miller, Dict.* ed. 8, No. 10 (1768).

Two sterile specimens, correctly identified, from Monterey, by Hindes.

P. PUMILA, *Regel in Cat. Sem. Hort. Petersb.* 23 (1858).

A small sterile specimen labelled '*P. pygmaea*, F. Dahuria,' received from Fischer.

P. HALEPENSIS, *Miller, Dict.* ed. 8, No. 8 (1768).

Two specimens, one cone-bearing, the other sterile, collected by Th. Kotschy (No. 419) at Bulgar Dagh, Sept. 28, 1853.

Two specimens, correctly identified, one bearing male strobiles, communicated by Bentham, from Montpellier, the other with an immature cone, labelled '*P. alepica*.'

P. ECHINATA, *Miller, Dict.* ed. 8, No. 12 (1768).

A small envelope of leaves and seeds of this species, labelled '*P. Royleana*, N.W. India, Jamieson.'

A sterile unnamed specimen * collected in Louisiana by Drummond.

P. EXCELSA, *Wallich, List*, No. 6059 (1828).

Wallich's specimen, No. 5059 (sterile), '*P. excelsa*, Wall., in Herb. 1824,' from Nepal.

Two sterile specimens collected by J. D. Hooker and T. Thomson in Sikkim (cult.) at 6000–10,000 ft., and Kashmir, 5000–11,500 ft. respectively.

P. GERARDIANA, *Wallich ex Lambert, Gen. Pinus*, ii., 145, t. 79 (1832).

Two specimens, one bearing male strobiles, so-named, collected by T. Thomson in Kunawer at 6000–10,000 ft. elevation.

P. SINENSIS, *Lambert, Gen. Pinus*, iii., t. 2 (1837).

A sterile specimen, correctly identified, collected by Hindes in Hong Kong.

P. INSULARIS, *Endlicher, Syn. Conif.* 157 (1847).

A sterile specimen collected by Cuming on the Philippine Islands; the preceding and this specimen on the same sheet.

P. AYACUHUITE, *Ehrenberg ex Schlechtendal in Linnaea*, xii., 492 (1838).

A sterile specimen labelled '*P. melanocarpa*, Bth.,' collected by Graham (No. 325 B.) in Mexico.

var. VEITCHII, *Shaw, Pines of Mexico*, 10, t. v. (1909).

Seven leaf-bundles, with two packets of seeds, labelled '*Pinus Don Pedri*, Mexico, Roezl.'

Two sterile specimens labelled '*P. Bonapartea*, Mexico, Roezl.'

P. LONGIFOLIA, *Roxburgh, Fl. Ind.* iii., 651 (1832).

Two sterile specimens collected by J. D. Hooker in Sikkim at 1000–2000 ft. elevation. A specimen with male strobiles collected by Wallich, accompanied by a label :- '6063. *Pinus Smithiana*, Wall. Himalaya.'

P. CEMBRA, *Linnaeus, Sp. Pl.* 1000 (1753).

A sterile specimen from the Tyrolese Alps by Elesmann.

A sterile specimen from a scarcely decipherable locality by A. F. Láng.

P. PINEA, *Linnaeus, Sp. Pl.* 1000 (1753).

A sterile specimen, correctly identified, gathered by Elesmann on the Southern Tyrolese Alps.

P. KHASYA, *Royle in Gard. Mag.* (1840), 8.

Three specimens, two cone-bearing, collected by J. D. Hooker and T. Thomson in Khasia, 2000–6000 ft. elevation, labelled '*Pinus sinensis*, Lamb ?'

A specimen with an immature cone, collected by Lobb on the Khasya Hills at 4000–5500 ft. ; accompanied by a pen-and-ink sketch of a matured cone ; labelled '*P. sinensis*.'

P. PEUKE, *Grisebach*, var. VERMICULATA, *Christ ex Beissner, Nadelholzkunde*, 286 (1891).

A specimen, accompanied by an immature cone, from Peristeri or Lyncos, Macedonia, from Haage and Schmidt, Erfurt (not identified). A letter from the senders, advising the despatch of the specimen, and requesting its name, is pinned to the sheet.

P. CANARIENSIS, *Ch. Smith in Buch, Phys. Beschr. Canar. Ins.* 159 (1825).

A sterile specimen, correctly named, collected by Forbes on Teneriffe.

Two cone-bearing specimens, correctly identified, and collected by E. Bourgeau (No. 1500) on the same island at 1800–2500 met. elevation.

P. MONTANA, *Miller, Gard. Dict.* ed. 8, No. 5 (1768).

Four specimens with male strobiles, with a pen-and-ink sketch of a fully matured cone, not identified, and labelled 'Erzeroum, Calvert, 1382.'

var. PUMILIO, *Willkomm, Fōrst. Fl.* 175 (1875).

A sterile specimen, labelled *P. pumilio*, W. Kit., from the Carpathians ; ex Herb. A. F. Láng.

P. FLEXILIS, *James in Long's Exped.* ii., 34 (1823).

A large sterile specimen collected by A. Fendler in New Mexico (No. 832) in 1847, labelled '*P. Llaveana* ? or *cembroides* ?'

P. SYLVESTRIS, *Linnaeus, Sp. Pl.* 1000 (1753), excl. var.

A form of this species accompanied by two cone-scales, labelled '*P. sylvestris*, L., from the Goldberg about Käsmark ; ex Herb. A. F. Láng.'

P. SABINIANA, *Douglas in Trans. Linn. Soc.* xvi., 749 (1833).

A sterile specimen correctly named ; origin unknown.

P. BALFOURIANA, *Balfour, Oregon Exp. Report*, 1, t. 3, f. 1 (1853).

A specimen bearing an immature cone, so-named, collected by Jeffrey (No. 618), on the range of mountains between Castey and Scott's Valley, Lat. 41° 50′.

P. LAMBERTIANA, *Douglas in Trans. Linn. Soc.* xv., 500 (1827).

A sterile specimen, so-named, collected by Douglas in North-west America.

P. KORAIENSIS, *Siebold and Zuccarini, Fl. Jap.* ii., 28, t. 116 (excl. figs. 1–4), (1844).

Three sterile specimens, correctly named, from Japan and the island of Jesso, J. G. Veitch, 127.

P. CHIHUAHUANA, *Engelmann in Wisliz. Tour. N. Amer.* 103.

Two unnamed sterile specimens * collected by C. Wright (No. 1888) in New Mexico, 1851–52.

P. PARVIFLORA, *Siebold and Zuccarini, Fl. Jap.* ii., 27, t. 115 (1844).

Two sterile specimens, so-named, collected by J. G. Veitch (No. 143) on Mount Hakone, Japan; accompanying the specimen is an envelope containing two seeds of the species.

P. DENSIFLORA, *Siebold and Zuccarini, Fl. Jap.* ii., 22, t. 112 (1844).

Two small specimens, one cone-bearing, the other sterile, labelled '*Pinus sp.*,' collected by Veitch (No. 417) in Yeddo.

Two sterile specimens labelled as the preceding, collected by Veitch (No. 420) in Yeddo (' only seen cultivated in gardens ').

Three sterile specimens accompanied by an envelope containing a few seeds, correctly named, from Veitch (J. 145), Kanagawa.

A sterile specimen, labelled '*Pinus sp. fol. var.*? Foliage green striped with yellow; a tree 30–40 ft. high; hills near Kanagawa.' Veitch, 95.

A cone-bearing specimen labelled '*Pinus sp.* (Chefoo), China; Fortune, Oct. 1861.'

P. TAEDA, *Linnaeus, Sp. Pl.* 1000 (1753).

A specimen * with male strobiles, correctly named, from Houston, Texas, April; without information as to collector.

P. CONTORTA, *Loudon, Arb. et Frut. Brit.* iv., 2292 (1838).

A specimen bearing an immature cone, labelled '*P. mitis*,' collected by Jeffrey at Nesqualley, June 8, 1852.

P. LARICIO, var. PALLASIANA, *Endlicher, Syn. Conif.* 179 (1847).

Two specimens, one sterile, the other with male strobiles, labelled '*P. Pallasiana*, Lambert.'

P. PINASTER, *Aiton, Hort. Kew.* iii., 367 (1789).

Two sterile specimens, one unnamed, from Narbonne by Bentham, the other bearing male strobiles and named '*P. maritima*, Lam., Des Landes, Endress, April, 1831.'

P. CONTORTA, *Loudon, Arb. et Frut. Brit.* iv., 2292 (1838).

A sterile specimen labelled P. MACINTOSHIANA; California, W. Murray.'

A small cone-bearing specimen, labelled '*P. contorta*, Douglas, from N. West America, by Douglas in 1826.'

Besides the specimens enumerated there are four sheets of fruits and two pen-and-ink sketches depicting various species of Pines.

Sheet I. contains figures of *Pinus Benthamiana* (*P. Coulteri*); *P. tuberculata*, Gordon; *P. radiata*, D. Don (*P. insignis*), and *P. cembroides*, Gord. (*P. edulis*).

Sheet II. *P. Gordoniana* (*P. Montezumae*); *P. Grenvilleae*, Gord. (*P. Montezumae*); *P. Wincesteriana*, Gord. (*P. Montezumae*); *P. Orizabae* (*P. Pseudostrobus*).

Sheet III. *P. Fremontiana* (*P. edulis*); *P. muricata*, D. Don; *P. Montezumae*, Gord. (*P. Hartwegii*); *P. Pithyusa*, Steb. (*P. halepensis*) and *P. Laricio*; the last two being the pen-and-ink sketches alluded to above.

PICEA EXCELSA, *Link in Linnaea*, xv., 517 (1841).

A sterile specimen with three cone-scales labelled '*Pinus Abies L.*' (locality undecipherable), ex Herb. A. F. Láng, with no information as to locality or collector, on the same sheet as a cone-bearing specimen of *P. Albertiana*.

P. BICOLOR, *Mayr, Abiet. Jap. Reich.* 49, t. 3, f. 8 (1890).

An envelope labelled '*Abies Alcoquiana*,' containing a mixture of cone-scales of *P. bicolor*, Mayr, and leaves of *P. hondoensis*, Mayr, l. c. 51, t. 4, f. 9, as has been shown by Henry; *cf.* Elwes and Henry, *Trees of Gt. Britain and Ireland*, vi., 1372 (1912).

P. AJANENSIS, *Fischer ex Lindley and Gordon, Trans. Hort. Soc.* v., 212 (1850).

A twig, cone, and packet of leaves, cone-scales and seeds, labelled '*Abies microsperma.*' (Lindley in *Gard. Chron.* (1861), 22.)

P. SPINULOSA, *Henry in Gard. Chron.* xxxix., 219 (1906). (*P. morindoides*, Rehder in *Sargent, Trees and Shrubs*, i., 95, t. 48 (1903).)

A sterile specimen, labelled '*Ab. Smithiana*, Wall.,' collected by J. D. Hooker in Sikkim, 8000–10,000 ft.

P. HONDOENSIS, *Mayr, Monograph. Abiet. Jap.* 51, t. iv., f. 9 (1890).

A sterile specimen with an accompanying envelope of leaves and a twig, labelled '*Veitchia japonica*; cultivated, Yeddo,' from Japan by Veitch, with two pen-and-ink sketches of malformed cones, upon which the genus *Veitchia* was founded.

P. POLITA, *Carrière, Conif.* 256 (1855).

Three stout sterile specimens, accompanied by three envelopes containing leaves and seeds, collected by Veitch in Japan, and labelled '425. *Abies polita?* (Siebold); tree 80–90 ft. high, found on mountains in the northern provinces of Nippon; cones of a green color and pendulous.'

P. ENGELMANNI, *Engelmann in Trans. St. Louis Acad.*, ii., 212 (1863).

Two sterile specimens with an accompanying envelope of leaves, labelled 'Pl. Novo-Mexicanae, No. 833, A. Fendler, Coll. *A. Menziesii?* 1847.'

P. ALBA, *Link, Handb.* ii., 478 (1831).

A small specimen on the same sheet as the preceding, bearing male strobiles, accompanied by a packet of leaves, not identified, and labelled 'Thurland Castle, Kirkby Lonsdale, Westmoreland, May 4, 1858.'

P. ALBERTIANA, *Stewardson-Brown in Torreya*, vii., 126 (1907).

A specimen bearing four cones labelled 'Palliser's Brit. N. Am. Expl. Exp. *Abies alba*, Mich., Rocky Mountains, coll. E. Bourgeau, 1858.'

PSEUDOLARIX FORTUNEI, *Mayr, Monog. Abiet. Jap.* 99 (1890).

Two sterile specimens labelled '*Abies Kaempferii*, Chekiang, May, 1855.'

KETELEERIA FORTUNEI, *Carrière in Rev. Hort.* (1868), 132.

A single specimen with male strobiles, collected by Fortune at the 'Temple of Koo-shan, nr. Foochow-foo.' labelled *Abies? Jesoensis*, subsequently *Ab. firma*, S. and Z.; correctly identified by A. Henry.

Two small sterile specimens labelled 'Hort. *Abies jezoensis.*'

LARIX EUROPAEA, *De Candolle, Fl. Franc.* iii., 277 (1805).

A small specimen accompanied by a cone, labelled '*Pinus Larix*, Linn., ex Herb. A. F. Láng; from the Carpathians.'

L. LEPTOLEPIS, *Endlicher, Syn. Conif.* 130 (1847).

A sterile specimen collected by Veitch in Japan, labelled 'J. 92 *Abies leptolepis*; Mt. Fusi-Yama.'

Two specimens, the larger sterile, the other cone-bearing, collected by J. G. Veitch in Japan, labelled '*Abies leptolepis.*'

L. GRIFFITHII, *J. D. Hooker, Ill. Himalay. Pl.* t. 21 (excl. ff. 1–4), (1855).

Three specimens, two sterile, one cone-bearing, collected by J. D. Hooker in Sikkim, 9000–11,000 ft. and named by him.

CEDRUS LIBANI, *Barrelier, Pl. Icon.* 499 (1714).

Two sterile specimens accompanied by two cone-scales, collected by Th. Kotschy (No. 416) at Bulgar Dagh; the scales are probably those of *C. atlantica.*

var. ARGENTEA, *Antoine and Kotschy, Iter. Cilic.* No. 417.

Kotschy's specimen (No. 417), bearing immature male strobiles, from Bulgar Dagh.

C. ATLANTICA, *Manetti, Cat. Pl. Hort. Modician, Suppl. Sec.* 9 (1845).

Balansa's specimen with portion of a cone, correctly named, from Dzebel-Tougoar, near Batna, Jan. 24, 1853.

C. DEODORA, *Lawson, Agricult. Man.* 381 (1836).

A small specimen with four male strobiles, labelled '5060, *Pinus Deodara*, Roxb. (*Cedrus Deodara*, Hb. 282).'

PSEUDOTSUGA DOUGLASII, *Carrière, Conif.* 256 (1867).

Two specimens bearing male strobiles and a cone respectively, labelled '*A. Douglasii*, N.W. America, Douglas.'

A sterile specimen from North America by Douglas.

One sterile specimen from North-West America by Douglas, 1830.

One specimen with male strobiles, collected by Mrs. Henry Crease on Vancouver's Island.

var. GLAUCA, *Beissner, Nadelholzkunde*, 419 (1891).

A large sterile specimen collected by A. Fendler (No. 829) in New Mexico in 1847, labelled '*A. Douglasii.*'

Two specimens, one cone-bearing, labelled '*Abies sp. n.* Moran. Oct. 38, Hartweg.'

Two sterile specimens labelled '*Abies Douglasii,*' collected by C. Wright (No. 1885) in New Mexico, 1851–52.

TSUGA DIVERSIFOLIA, *Masters, Journ. Linn. Soc.* (*Bot.*) xviii., 514 (1881).

Three specimens, two cone-bearing, collected by J. G. Veitch in Japan, and labelled '*Abies Tsuga,*' agreeing with the species, except that the peg-like projections of the twigs are glabrous.

T. BRUNONIANA, *Carrière, Traité Conif.* 188 (1855).

Three specimens, two cone-bearing, one sterile, the latter and a cone-bearing collected by J. D. Hooker in Sikkim, 8000–10,000 ft., labelled '*Abies dumosa,* Don.' Wallich's specimen (No. 6061), labelled '*Pinus Brunoniana,* Wall., and *P. decidua,* Wall., in Herb. 1824,' are from Nepal.

TSUGA PATTONIANA, *Sénéclauze, Conif.* 21 (1867).

A specimen bearing one mature and three immature cones collected by Jeffrey (No. 430) on the Cascade Mts., at 6000 ft. elevation, Lat. 42°, Oct. 15, 1852, and labelled '*Abies Patonii.*' Correctly identified by Dr. A. Henry.

ABIES PINDROW, *Spach, Hist. Veg.* xi., 423 (1842).

A sterile specimen from the Himalayas by Wallich, labelled '6065, *Taxus? Lambertiana,* Wall.'

Two sterile specimens labelled *Ab. Webbiana,* Wall.,' collected by T. Thomson in the Western Himalayas at 9000–12,000 ft. elevation.

A. WEBBIANA, *Lindley in Penny Cyclop.* i., 30 (1833).

Two specimens, one bearing male strobiles, one sterile, accompanied by an immature cone, labelled '*Ab. Webbiana,* Wall.,' collected by J. D. Hooker in Sikkim at 10,000–12,000 ft. elevation.

A. CEPHALONICA, *Loudon, Arb. et Frut.*, iv., 2325 (1838).

A sterile specimen without information as to locality or collector.

A. PINSAPO, *Boissier, Biblioth. Univ. Genève,* xiii., 167 (1838).

Similarly, a sterile specimen of unknown origin ; correctly identified.

A. RELIGIOSA, *Schlechtendal in Linnaea,* v., 77 (1830).

A large sterile specimen named *Pinus religiosa,* collected by Graham (No. 319 B.) in Mexico.

A. GLAUCESCENS, *Roezl, Cat. Gr. Conif. Mex.* (1858–59), 5.

Two specimens with accompanying cone-scales and two unfinished pen-and-ink sketches of the cones by Lindley ; collected by Roezl in Mexico in 1858. One is labelled '*Abies glaucescens,*' the other '*A. religiosa.*'

A. CONCOLOR, *Lindley and Gordon, Journ. Hort. Soc.* v., 210 (1850).

A sterile specimen collected by A. Fendler (No. 828) in New Mexico, 1847, labelled '*Pinus concolor,* Engelm.'

A. AMABILIS, *Forbes, Pinet. Woburn*, 125, t. 44 (1840).

A sterile, probably cultivated specimen, correctly identified.

A sterile, probably cultivated specimen, labelled *Abies grandis*, but not *A. grandis*, Lindley in Penny Cyclop. i., 30 (1833).

A. NOBILIS, *Lindley*, l. c. 30.

A sterile, probably cultivated specimen, so named.

A sterile native specimen collected by Jeffrey on the Chastey Mts. at 6000 ft. elevation, Lat. 41° 50′, Oct. 17, 1852.

A. CILICICA, *Antoine and Kotschy, Bot. Wochenbl.* (1853), 409.

Two sterile specimens collected by Th. Kotschy, Nos. 415 and 339 b., at Bulgar Dagh, Aug. 1853.

A. FIRMA, *Siebold and Zuccarini, Fl. Jap.* ii., 15, t. 107 (1844).

A sterile specimen labelled '*Abies bifida*; cultivated in gardens, Yeddo, Japan. Veitch.'

A. BRACHYPHYLLA, *Maximowicz, Mél. Biol.* vi., 23 (1866).

A sterile specimen gathered by Veitch (No. 144) in Japan, on a mountain at the back of Kanagawa, labelled '*A. firma.*'

A. VEITCHII, *Lindley in Gard. Chron.* (1861), 23.

Two small specimens, one bearing a solitary cone, collected by J. G. Veitch in Japan.

A. HOMOLEPIS, *Siebold and Zuccarini, Fl. Jap.* ii., 17, t. 108 (1844).

A sterile specimen on the same sheet as *Abies Webbiana*, and so named; doubtless of garden origin.

A. BRACTEATA, *Nuttall, Syl. N. Amer.* iii., 137, t. 118 (1849).

A sterile specimen collected by Douglas in California, labelled '*Taxodium sempervirens*, Hook. Ic. 579.'

Another sterile specimen, correctly named, collected by Jeffrey, No. 119.

CEREUS × KEWENSIS.

By A. Worsley, F.R.H.S.

This hybrid (*C. MacDonaldiae* × *C. nycticalus* (?))* was raised in the Royal Gardens, Kew, about twenty years ago. It does not retain the floriferous character of *C. MacDonaldiae*, and has only recently borne flowers. In October, 1910, and again in June and in October, 1912, flowers were produced but no fruit resulted.

C. MacDonaldiae is a native of Honduras and comes in Schumann's classification under "Series Principales" [*Branches with 5 to 7 angles or ribs, sometimes cylindrical when old; spines not multiplied in old age; sepals yellow or brown, rarely red, petals white*] and is given this short specific description in the Keys of his *Monograph of Cactaceae*, viz.—*Areoles only with spines, without hairs. Branches almost round, sometimes tubercled; flowers very large, yellow and white.* I have grown *C. MacDonaldiae* for many years and have found it very floriferous when allowed to cling to the damp wall of a hot-house and ramble along the roof. One year I gathered more than ten dozen blooms off a single plant. The flowers measure from 12 to 14 inches across, and, as they expand just after 6 P.M., they are of great value for the decoration of the dinner-table.

But it is not necessary to grow this plant in a hot-house, for it will endure slight frost without injury. One very large old plant survived nine degrees of frost, although it was seriously crippled by the trial. Yet the flowers borne in a green-house are not so large as they would be under more favourable conditions.

C. × *kewensis* does not seem to differ from this parent in its cultural requirements. Its flowers are distinct and are perhaps of equal beauty. Of all the published figures they most nearly resemble those of *C. Lemairei* [Garden, January 30, 1892] but differ in respect of scales, and stigmas; moreover, *C. Lemairei* belongs to the series "Triangulares."

C. × *kewensis* is a fugacious, night-flowering plant, of good constitution.

* There is some doubt about the parentage. It is certain that *C. MacDonaldiae* was one parent, but the other parent is doubtful. There is a record of a cross with a garden Phyllocactus, but no trace of this can be seen in the hybrid, and all other attempts [I have tried more than fifty times] to cross *C. MacDonaldiae* with Phyllocactus have failed to produce seeds. I have suggested *C. nycticalus* as the most probable parent.

DESCRIPTION AND COMPARISON.

	C. × *kewensis.*	*C. MacDonaldiae.*
Stem.	Attaining a length of about 6 to 12 ft. before flowering, serpentine, about 1 inch diameter or double as stout as in *C. MacDonaldiae* and without the nodular swellings; typically quadrate (3 to 5 ribs), with little inclination to form branch-stems.	½ an inch or more in diameter, 5 to 6 ribbed (flowering generally on the 5-ribbed stems), swollen at the nodes, branching freely.
Spines.	Nodular spines shorter than in *C. MacDonaldiae*. At maturity there are (typically) a pair of very short spines at each node, set in an inconspicuous white pappus, but the young growths are also furnished with soft, deciduous hairs, after the style of *C. nycticalus*.	About 3 nodular spines, longer than in *C.* × *kewensis*, and generally deciduous after some years as the bark becomes hard.
Flower-buds.	First appear in the form of purple scales, quite unarmed.	First appear as a bunch of short bristles.
Flower.	Under a foot long, made up of ovary (1½ in.), tube (4½ in.) and petals (5½ in.).	15½ to 16 inches long, made up of ovary and tube (9 inches) and petals (7 inches).
Ovary and Tube.	Quite unarmed, but bunches of soft hairs are hidden under the wide, fleshy scales which cover both ovary and tube. The scales are at first (on the ovary) ⅜ to ¼ in. wide and long and of a purplish-green colour, but they continually lengthen towards the mouth of the tube where they are 3 to 4 in. long but without any increase in width. The longest scales are free in their upper 2 in. of length, but adhere to the tube in their lower half. The colour of these tube-scales becomes more ruddy-green the nearer they are to the mouth of the tube, and their free ends become distinctly red.	Ovary densely armed, the tube covered with conspicuous hairs. Scales inconspicuous and green.

DESCRIPTION AND COMPARISON—*cont.*

	C. × *kewensis.*	*C. MacDonaldiae.*
Flowers.	Expanding at dusk and closing at dawn ; exhaling a faint, sappy smell. Span 11 to 12 in.	Expanding at dusk and closing at dawn ; exhaling a faint, sappy, smell. Span 13 to 14 inches.
Sepals.	Slightly longer but considerably narrower than the inner segments (petals). Of a brownish-straw colour and ⅜ in. wide.	Slightly longer (6 to 7 inches) but much narrower (¼ to ½ inch) than the petals. Brown in the very outer to primrose-yellow in the inner sepals.
Petals.	White ; from less than an inch up to 1¼ in. in width.	White ; an inch or more in width.
Style.	Remarkably stout, intermediate in length between that of the inner and outer segments of the perianth, branching into 19 to 21 simple stigmas (some of these 1 to 1¼ inch long), the whole of a uniform yellow colour	Very stout, as long as the petals, branched into 20 to 23 simple or compound stigmas spreading over a diameter of over 2 inches. The whole white or straw-yellow.
Stamens.	1½ inch shorter than the style, and rather lighter in colour.	Very numerous (200 to 250).
Pollen.	Light yellow.	White or straw-yellow.
Fruit.	Unknown.	I have never seen the fruit of this species.

HYBRIDS OF *PHYLLOCACTUS CRENATUS* AND *CEREUS GRANDIFLORUS*.

[*Phyllocactus* × *Cooperi*, *P.* × *Wrayi*, and *P.* × *Thomasianus*.]

By A. Worsley, F.R.H.S.

In tracing the parentage of these alleged hybrids we meet with contradictory assertions and evidence.

(1) As to the parentage of *Phyllocactus* × *Cooperi*. I pointed out in 1906, at the Third International Conference on Genetics held in London,* that this plant could not be classed as an "ascertained hybrid." To avoid any possible error in nomenclature I interviewed Mr. Cooper, after whom *P.* × *Cooperi* received its name, and he kindly visited my garden and examined my plants of *Cooperi* whilst they were in bloom. He was quite positive of the identity of my plants with the original *Cooperi*, and pointed out certain peculiarities of this form (such as its habit of carrying flowers at the bases of the stems only just above the ground). He then gave me the following information about its earliest history. He obtained it about 1870–75 from the collection of Mr. Wilson Saunders of Reigate; its origin was then unknown and there was no claim then made that the plant was a hybrid. Some time in 1890–98 this plant was in the Kew collection as a hybrid between *P. crenatus* and *C. grandiflorus*. I flowered and described it in 1899. It is now widely spread in gardens. It is said that *P. crenatus* and *C. grandiflorus* have been recently re-crossed on the Continent and have again given *Cooperi*, or something very like it. On the other hand Prof. Gürke says that this hybrid was raised in Germany about 1880 by the father of the present F. A. Haage, Junr., and resulted, not in *Cooperi*, but in *Wrayi* †—a plant quite distinct therefrom.

I have raised more than 1000 seedlings of *Cooperi* and have not found a single one of them that reverted to the reputed male parent. But all these plants were crosses, and I think it is very difficult to impregnate *Cooperi* with its own pollen. All my chance fruits proved to be crosses.

(2) Even as to the comparatively modern *P.* × *Wrayi* some confusion has arisen through faulty systems of genealogy. Instead of following the well-established rule of tracing ancestry by mother-kin, confused statements are put forward and the reputed male parent is sometimes given priority to the known female. For instance, in *Blühende Kakteen* the parentage of this plant is given in the heading as *C. grandiflorus* × *P. crenatus*, but a little further down the order

* *Report Conference on Genetics*, 1906, R.H.S., pp. 407–9.

† *Blühende Kakteen* [Profs. Schumann and Gürke], Pt. 16, Pl. 62 (coloured).

DESCRIPTIONS.

	P. × *Cooperi*	*P.* × *Wrayi*	*P.* × *Thomasianus* *
Stem	Flat, not markedly crenate, about 2½ feet high.	Flat, crenate, 5 feet high.	
Spines	2 or 3 soft hairs at the nodes, ultimately partly deciduous.	Unarmed.	Unarmed.
Buds	Ruddy, unarmed, freely produced, often near the ground.	Borne on the apicial nodes, sparingly; first appear as large, irregular, unarmed scales.	
Tube	Smooth above but with hairs and scales in a bunch below, not angled, 6 inches long, yellow.	Five-angled, scaly, 5 inches (or more in Schumann's spec.), irregularly curved, green flushed ruddy.	Curved, about 6 inches long.
Scales (on tube)	About 10 narrow ruddy-brown scales, from ⅛ to ⅝ inch long by ⅛ inch max. width.	On the ribs or angles only, about 15 in all, pink, from ¼ inch long (below) to 2 inches long (above).	
Expansion of flower	Night-flowering, lasts for following 2 days.	Do.	
Sepals	*Outer* ruddy, ¼ inch wide; *inner* yellow or tawny, ⅓ inch wide.	*Outer* brownish yellow, under an inch wide. [Orange in Schumann's spec., and red in Hildmann's variety.] *Inner* greenish-yellow to cream [yellow in Hildmann's variety]. *P.* × *Meyereanus* is a pure albino form of this hybrid.	Yellow to brown, but not brilliantly coloured.
Petals	White, 1¼ inch wide [I have a lemon-yellow to cream form], shorter than the outer sepals.	Do. The sepals and petals combined are not numerous, generally about 23 or 24 altogether.	White.
Length	10 inches or less, made up of tube 6 inches + sepals 3½ to 4 inches.	9 inches, made up of tube 5 inches + sepals 4 inches.	
Span of flower	8 to 9 inches.	7 inches.	
Fragrance	On the night of expansion an intense lemon-odour is given off, but this fragrance soon dies down.	An intense sickly-sweet smell is given off for a few hours after expansion of flower.	
Stamens	White, shorter than petals.	Greenish, shorter than petals.	Very numerous, yellow.
Anthers & Pollen	Whitish.	Nearly white.	
Style	White, the same length as the petals.	White, shorter than petals.	Yellow.
Stigmas	10 to 12 simple stigmas, white.	8 or 9 simple stigmas, white.	14 stigmas; yellow (?)
Fruit	Takes from 1½ to 2½ years to ripen, it then weighs an ounce or more, and contains from 200 to 400 seeds. Eye crateriform, the fruit bearing about 15 warty, hairy or spinous nodes, with about a dozen hairs or spines on each node. With age these are often partly or entirely deciduous.	Not known to me.	Not known to me.

* As described by Schumann, and in plate 41 *Blühende Kakteen*.

FIG. 22.—PRIMULA ALGIDA, Adams

FIG. 23.—PRIMULA LONGIFLORA, All.

[*To face p.* 96.

FIG. 24.—PRIMULA FRONDOSA, Janka

of parentage is reversed, and we are told that the hybrid was raised on *P. crenatus*. In certain botanical lists the faulty genealogy in the heading has been copied, and whatever effort we may now make to correct it, it will be impossible to catch up this mistake.* This shows the importance of following mother-kin in genealogies of plants. Maternity, as DRAPER said, is a matter of fact, paternity of speculation; and, although it is true that this speculation may be avoided, the proof that it has been avoided is rarely forthcoming.

(3) *P.* × *Thomasianus* † is listed by the late Dr. SCHUMANN as a hybrid of the same section as *P.* × *Wrayi*. It resembles the latter in three respects: (1) the plant is quite unarmed, (2) the tube is distinctly curved, and (3) the flowers are white with yellow to brown sepals. These three characters appear as constants in all the ascertained hybrids of *P. crenatus* and *C. grandiflorus*. But *P.* × *Thomasianus* differs from *P.* × *Wrayi* in having a 14-partite yellow stigma and also (perhaps) in the great number of its yellow stamens. Moreover, in *P.* × *Wrayi* the tube is longer and the sepals more intensely coloured.

I have found no evidence that from some known hybridization of Cacti diverse hybrids may result, even if we include reversed genders. But, if we accept the allegations which are made, then not only are the diverse hybrids *Wrayi* and *Cooperi* of the same parentage, but we must believe that no fewer than nine presumably distinct hybrids have sprung from the intercrossing of *C. grandiflorus* and *C. speciosissimus*.‡

I know of but one instance in which diverse hybrids have sprung from one interspecific cross, and this did not occur among the Cactaceae. § Hence we must await evidence before accepting statements which contradict our general experience of interspecific hybridizations.

Comparison between P. Wrayi and P. Cooperi.

There are at least seven characters in which conspicuous differences are noticeable. *P.* × *Wrayi* is taller, quite unarmed, and carries its flowers near the top of the stems; × *Cooperi* is dwarfer, armed, and carries many of its flowers very near the ground level. The tube in × *Wrayi* is 5-angled and bears large scales; in × *Cooperi* the tube is nearly smooth, not angulate, and bears small scales. The green stamens of × *Wrayi* give the flower a greenish tinge not to be seen in × *Cooperi*, and the fragrance of the flowers is quite different.

* It is possible that *Wrayi* and *Cooperi* may be the product of the same parents but with gender reversed.

† *Blühende Kakteen*, Pl. 41; SCHUMANN, *Monograph*, V. 1895.

‡ Conference on Genetics, London, 1906, p. 407.

§ *Ibid.* p. 411.

PRIMULA CONFERENCE.

WEDNESDAY, APRIL 16, 1913.

Chairman: Sir J. T. D. LLEWELYN, Bart., V.M.H.

PROGRAMME.

MORNING SESSION—11 A.M. TO 1 P.M.

Papers.

'European Primulas.' Dr. JOHN MACWATT.
'Primula Hybrids in Nature.' Mr. R. FARRER, F.R.H.S.

AFTERNOON SESSION—2 P.M. TO 4 P.M.

Papers.

'Chinese and other Primulas.' Professor I. BAYLEY BALFOUR, F.R.S., V.M.H., Regius Keeper, Royal Botanic Garden, Edinburgh.
'Himalayan Primulas.' Mr. W. G. CRAIB, M.A., Assistant for India, Herbarium, Royal Botanic Gardens, Kew.
'Primulas in the Garden.' Miss GERTRUDE JEKYLL, F.R.H.S.

MORNING SESSION.

IN opening the proceedings, the CHAIRMAN said: It was in the year 1886 that the last Primula Conference organized under the auspices of the Royal Horticultural Society took place, and now it has been felt that after the lapse of time we have learned so very much more of the genus *Primula* that it is desirable that our observations and the records of our observations should be brought to a new Conference. At the time of the former Conference there were many men whose names are familiar in our ears as household words, men well known in the botanical and horticultural world, who took a part with us on that occasion, but who, alas! are with us no longer now—men like Sir JOSEPH HOOKER, Mr. SHIRLEY HIBBERD, Dr. MAXWELL MASTERS, Sir MICHAEL FOSTER, the Rev. F. D. HORNER, JAMES DOUGLAS, Mr. CHURCHILL, and many others. And there is an advantage in knowing that that Conference was held under the auspices and by the assistance of men of that standing, for I think not only has the knowledge but the love of the genus *Primula* grown very much since that day. This justifies the action of the Royal Horticultural Society to-day in asking that there should be a fresh Conference on the subject we have in hand. No doubt a very great advance has been made by the discovery of new species, more especially in China, I suppose, but also in our knowledge of the natural hybrids

of the European species which inhabit the Alps of mid-Europe. The great Himalayan range in Northern India, and other parts of the world, have also furnished new forms. Upon all these different subjects we are to have papers which I believe will be very attractive to you, and, I hope, a useful addition to the records of the Society. Contemporarily with the Conference that we held we received a paper prepared for us by Professor STEIN of Breslau and one was also prepared by Mr. DEWAR, then at Kew, which was extremely valuable to us. What I wish to say now will be extremely brief, because the Royal Horticultural Society has selected certain experts who are to give us the gist of the advance of knowledge which has been acquired in regard to the genus, and it is not for a President to anticipate in any way the work that lies before you. I feel that the selections which have been made by the Royal Horticultural Society have been very wise ones, and I hope we shall all gain by what we hear. Not only that, but it will also stimulate us in bringing more people to care for the subjects we have in view, just as the Conference twenty-seven years ago stimulated the hardy-plant lovers, and especially the lovers of the genus *Primula*, to further exertions and further discoveries. We are, I am glad to say, to have lantern pictures to illustrate the remarks of the lecturers, and there are also interesting specimens on the table. My first duty is to call upon Dr. MACWATT to read a paper on

'EUROPEAN PRIMULAS.'

Dr. MACWATT: The Genus of Plants about which I am to speak for a short time to-day is one of the most beautiful and interesting in the whole vegetable kingdom. There is a quite peculiar fascination about the Primulas, to which I succumbed at a very early stage of my horticultural career, and from which I have not to this day been able to shake myself free. In habit, form, colour, and scent, they have a charm all their own, a charm which increases the more they are studied, and which no familiarity can diminish or render stale. And not only are they among the most beautiful of plants, but their beauty lies open and appeals to all sorts and conditions of men. The entire Temperate Zone of the Northern Hemisphere is their domain, and there is no part of it which is not glorified and gladdened by their presence.

In the spring of the past year I spent an afternoon in a partially wooded glen in my native county, Berwickshire. One of its sides faced the south and glowed with the ruddy gold of the furze, the other—a grassy slope—looked towards the colder north, but scarcely a blade of grass could be seen that day, so thickly did the flowers of our native primroses begem the ground—a pure delight to eye and heart. And though I have not myself been privileged as yet to enjoy the sight, I can well believe from the report of friends, that to see an alpine slope illumined by the purple glow of *Primula glutinosa* in its full glory is a spectacle of such surpassing beauty that he who has once

beheld it carries within his bosom ever after a glad recollection and an unappeasable longing.

I have been asked to confine what I have to say on this occasion to the Primulas of the European Continent. There are few of them that I have not grown, or done my best to grow, and though I cannot profess to speak with the authority of an expert on their botanical characters or distinctions a short account of my experiences in their cultivation may not be without some degree of interest or profit to some now hearing me.

Among the earliest of the spring flowers in our gardens are the varieties of *Primula vulgaris*, or as FLETCHER and SHAKESPEARE beautifully allude to it in the "Two Noble Kinsmen":—

> "Primrose, first-born child of Ver,
> Merry Springtime's harbinger!"

No true horticulturist can afford to neglect the cultivation of this beautiful class of plants. Their varying hues impart a charm to our gardens at a time when colour is most needed and appreciated. Apart, however, from their beauty they have also a claim on the gardener's skill on account of the diversity of treatment to which they lend themselves. In sun or shade, in the rock garden or in the flower border, they are equally at home and equally attractive.

So much by way of introduction.

European Primulas.—For the sake of convenience, and following PAX* and other recent botanical authorities, we may divide the European Primulas into three great sections, namely:—

(1) Vernales.
(2) Farinosae.
(3) Auricula.

SECTION VERNALES.

The three commonest of our native species fall to be treated under this section, *P. elatior*, *P. officinalis*, and *P. vulgaris*.

P. elatior, or the common Oxlip, which in its wild state grow profusely in Suffolk, Cambridge, and Essex, but is much less common in other parts of the British Isles. It has, however, a wide distribution in the cooler regions of the North Temperate Zone. This plant, which carries a number of pale yellow scentless flowers, borne in peduncled umbels, usually reaches perfection in April or May. It resembles the cowslip, *P. officinalis*, in so far as the inflorescence takes the umbellate form, but it differs from it in the important particulars that the blooms are more or less upright and the throat of the corolla is open without folds. The calyx is also more villous. By way of comparison or distinction it is interesting to note that bosses, which are entirely absent in this species, are present in the corolla of both the common primrose and cowslip. There are several varieties of this species,

* See pp. 219, 222.

namely, *genuina*, *carpathica*, *intricata*, *Pallasii*, and *cordifolia*, which seem to be for the most part only geographical forms. The Bardfield and Normandy Oxlip are merely local names. As there is no real difference between them and the type, I need not say a word about the cultivation of the Oxlip. All it asks is to be left alone, and if granted this boon it will speedily take possession of the entire garden.

P. officinalis, the common cowslip, is found wild everywhere in Britain and needs no description.* In the North of England it is known to grow at a height of 1600 feet above sea level, and it may be mentioned that over the Northern Hemisphere generally it is more widely distributed than the Oxlip, being found in regions as far apart as Western Europe and Eastern Asiatic Siberia, North-West Asia and Northern Africa. The varieties are *macrocalyx*, *canescens* or *pannonica* and *Columnae* or *suaveolens*. Some of these are merely colour forms, in others the distinguishing mark is the more or less inflated calyx, but all betray close affinity with the type.

Last of the British species we have *P. acaulis* or *vulgaris*, which is found wild in almost every part of these islands. Like the cowslip it even does well at an elevation of 1600 feet above sea level. It is common to all parts of Europe except the North-East.

P. acaulis, in its innumerable cultivated forms has been brought to a stage of great perfection, and no doubt is capable of still greater improvement. Many beautiful colour-forms of this plant have been raised. The largest form I have seen is 'Evelyn Arkwright' which I understand is a variety of the wild Primrose. Double Primroses are of peculiar value in the garden. Shelter from wind, partial shade, and good rich soil are essential for their well-being. It is generally stated that double Primroses cannot be raised from seed, but this is not the case, as it has been done, and I have brought with me some seedlings for your inspection.† The colours are new and the plants not yet in commerce.

The forms commonly called 'Jack in the Green' are very quaint and interesting. As is well known, both the cowslip and the primrose have a tendency to abnormal development of the calyx.

P. variabilis found in the Eastern counties, has primrose flowers in umbels on distinct stems.

P. acaulis var. *Sibthorpii* is a very early form of *P. acaulis*. The flowers are pink in colour and are in full perfection long before other primroses are out. It flourishes well in good soil, but sheltered and shady positions suit it best on account of its early flowering propensity. This is the plant sent out by nurserymen as *P. amoena* or *P. altaica*.

P. amoena genuina is, so far as I know, not in cultivation. It has a

* The flowers are generally buff-yellow in colour, but are sometimes seen in scarlet or orange.

† Some beautiful double flowers of charming colour and excellent form were exhibited. [Ed.]

distinct scape 3 to 4 inches long with an umbel of violet-blue flowers and comes from the Caucasus.

All the plants coming under this section I grow in good rich soil, with a considerable admixture of leaf mould and with a northern exposure.

Section Farinosae.

P. farinosa grows in its wild state in Northern England and the Southern parts of Scotland, and is widely distributed on the Continent of Europe.

Both in its wild and cultivated forms it is one of the most beautiful and attractive little Primulas we have. It is a plant that can be grown with very little difficulty, as it will stand a range of temperature from the warm Temperate to the Sub-Arctic. The two principal things it needs are a fair amount of moisture and moderate shade. It does well with me in ordinary soil in the open ground, where it forms large cushions. I may have been fortunate, but certainly have not experienced the same difficulty that some people say they have met with in growing it. It seeds freely, and as the seed germinates well there is little difficulty in keeping up a stock. I must mention one failing, however: it has a tendency even more marked than in other Primulas to throw itself out of the soil, and this waywardness has to be watched and corrected from time to time. The leaves are from 1½ to 2 inches long, ovate, spathulate, crenulate, obtuse or sub-acute, glabrous above and farinose below. Rising above the silvery leaves is a stout scape, 2 to 8 inches long, on which is carried a crowded head of spreading flowers, the colours of which range from pink lilac to white. Sometimes there is no scape—var. *acaulis*. The bracts are small, saccate at the base. The pedicels are usually shorter than the calyx. There are a great many varieties of *P. farinosa*, but they are of no use to the busy horticulturist. There, is, however, one sub-species or variety that I cannot pass without comment, as, like myself, it hails from Bonnie Scotland. I mean, of course, *P. scotica*, which flourishes in the pasture lands of Caithness, Sutherland, and the Orkney Islands, and is also found in Lapland, Norway, and Sweden.

The flower is of rich violet-purple colour, the beauty of which is intensified by its yellow throat. It is a smaller plant than *farinosa*, the bracts are less saccate, the leaves broader in proportion, and the calyx shorter. It has an unfortunate habit of damping off after flowering, but as it seeds freely there need be no difficulty in raising plants. One thing that has impressed me very much is the difference in the way in which the seeds of *P. farinosa* and *P. scotica* germinate. The seed of *P. farinosa* germinates soon after sowing, but those of *P. scotica* lie dormant until the following spring. Out of some hundreds of plants I had in flower last year all have died except two or three which are growing on the rockery, and I see they have

survived through the winter and are coming into flower again. It is worthy of mention that some of my plants of this variety flowered two or three times last season.

P. algida is a native of the colder parts of Europe and seems to be a species very nearly akin to *P. farinosa*. The leaves are very sharply toothed. (Fig. 22.)

P. stricta is simply a smaller *farinosa*. It is a native of Sub-Arctic Europe. The leaves are denticulate, the teeth being rounded. The under side of the leaves is not mealy as in *P. farinosa*. It has a pale pink flower.

P. longiflora is a native of South-Eastern Europe and flourishes particularly in the Carpathians, the Balkans, and the Caucasus. It carries an umbel of lilac-coloured flowers, and is distinguished by the great length of the corolla, which is about three times the length of the calyx. The pale green denticulated leaves are about $2\frac{3}{4}$ inches long, and from $\frac{1}{4}$ to $1\frac{1}{4}$ inch broad, oblong-ovate, slightly crenate and mealy on the under side. (Fig. 23.)

P. frondosa (fig. 24) is a Balkan plant. The true *P. frondosa*, Janka, is said to be a very rare plant and not the *P. frondosa* of gardens. I have examined one of Janka's type specimens and think the species is founded on very mature plants which had lost their mealiness. When the species we know as *P. frondosa* is grown in shade and fully developed, it agrees in every particular with Janka's specimen, and I cannot see for my part that there is any real distinction between them. We can only describe *P. frondosa* as a large form of *P. farinosa*.

P. sibirica is distributed in all parts of Northern Eurasia. It is a variable plant and useful on account of its hardiness. It throws up spikes which carry pale lilac or rose-coloured flowers. It is of easy culture and increases rapidly.

All the plants in this section I grow on the rockery in ordinary loam, taking care that they do not lack moisture during the growing season.

Section Auricula

is by far the most important, as, with the exception of the few species grouped under Vernales and Farinosae, it embraces all the European Primulas. In dealing with this section I follow Pax who divides it into seven subsections:

Subsection (1); **Euauricula**.—Foliage fleshy, entire or dentate. Bracts short and broad, calyx short, flowers yellow.

Under this subsection come *P. Auricula* and *P. Palinuri*.

P. Auricula is a well-known plant in gardens but the wild form is not so often seen in this country. Several modifications have resulted from its cultivation and changed geographical conditions. By nature it flourishes best, where it is most at home, amongst the limestone rocks of the Alps, the Apennines, and the Carpathians. In the wild state the flowers are comparatively small, but under

cultivation the scape often carries a big head of large-sized flowers. The leaves may be farinose or not. In form they are roundly-obovate, obovate or oblong lanceolate, glabrous on both sides with a narrow glandular margin which may be entire or denticulate. There are several varieties and forms, the most important being var. *albocincta* or *albomarginata*. The leaves of this variety are densely covered with farina, the margin being very distinctly marked with a white rim. This plant should be grown under glass to show its true character.

Forma monacensis is a strong grower, showing complete indifference to situation though with regard to soil it is highly selective, and has a decided preference for limestone. Its leaves are narrowly oblong and their length is about three times their breadth.

Forma serratifolia.—Foliage roundly obovate. Sharply and deeply serrate-dentate.

Forma exscapa, with no scape.

var. *Obristii* yields odorous flowers of a beautiful deep golden colour. Its leaves are glandular and surrounded with a membranous rim, the margin of which is hairy. The calyx and pedicels are farinose.

var. *ciliata* is the *bellunensis* and *Balbisii* of commerce. It is analogous to *Obristii* in respect of its beauty and small size, but in other points it is so clearly distinct that there is little difficulty in differentiating it. The plant is without farina. The leaves have a cartilaginous margin, glandulose, the pilose margin densely ciliate with long hairs. The flowers are inodorous.

var. *Widmerae*, with thin hairy leaves destitute of farina.

The second species, *P. Palinuri*, belongs to the Apennine regions of Southern Italy. It shows a remarkable facility for growth. The underground stem or rhizome is of wood and spreads itself over an extensive area. The leaves are of large size, being both broad and long. They are light green, fleshy, pliable, serrated at the margin and quite devoid of farina. In shape they are obovate or oblong, tapering off gradually to a petiole which varies considerably in length, sometimes being very long. The scape is erect and towers well above the enormous leaves, bearing at its summit an umbel of flowers which vary in number, reaching in some cases a maximum of forty. The flowers are borne on pedicels, the surface of which is thickly covered with a white mealy powder. The outer bracts, which are large and leafy, as well as the smaller inner ones, are also densely farinose. The flowers are all produced on one side of the scape, and present a drooping appearance. The calyx is covered with the same mealy powder, and is cleft to almost half its depth. It is bell-shaped, the lobes sharply pointed. The corolla stands well out beyond the calyx, and is of an intense golden yellow colour. *Primula Palinuri* does not bloom until it has attained a good size, but the

FIG. 25.—PRIMULA MARGINATA, Curtis

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FIG. 26.—PRIMULA CARNIOLICA, Jacq.

FIG. 27.—PRIMULA VISCOSA, All.

FIG. 23.—PRIMULA VISCOSA FORMA CYNOGLOSSIFOLIA, Widmer

FIG. 29.—PRIMULA SPECTABILIS, Tratt.

FIG. 30.—PRIMULA GLAUCESCENS, Moretti.

FIG. 33.—Primula vulgaris, Huds.

FIG. 34.—Primula acaulis, Hill.

FIG. 35.—PRIMULA HIRSUTA, All.

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flowers when produced are fairly abundant. In the cultivation of this plant it should be borne in mind that it thrives best in good loamy soil, to which some peat and sand have been added. Those who wish to be successful with it in cold districts should keep it under glass during the winter months, in an airy situation with plenty of light. If grown in the open a sheltered nook in the rock garden facing west suits its requirements best. *P. Palinuri* emits a strong cowslip odour. It flowers in May.

Subsection (2), **Brevibracteatae,** is composed of three species: *P. marginata*, *P. carniolica*, and *P. viscosa*. Their general characteristics are soft, pulpy, dentate or entire leaves, bracts short and broad, calyx short, with flowers violet or rose-coloured, occasionally white.

P. marginata is an abundant species in the Cottian and Maritime Alps. As a cultivated garden plant it is often grown under conditions that are not entirely favourable to its perfect development. Although an accommodating plant, it is a mistake to attempt to grow it vertically. Under such circumstances it can never do itself justice. In its native haunts it invariably adopts a drooping posture and hangs gracefully suspended over the rocky ledges of the crevices in which it grows. If we wish, therefore, to get rid of any incompleteness of development we must consider its natural conditions of growth and give its long fibrous rhizomes freedom to droop by selecting for it an elevated place in the rock garden. If grown on the level, when the stems become long and lanky the plants should be divided, and the separate pieces planted firmly and deeply. The leaves are farinose. They are oblong or obovate in shape and regularly dentate-serrate with a very distinct and charming silvery margin. The scape is often 4 inches in height and bears an umbel of from two to twenty flowers, varying in shade from rich violet to pure white. Some forms are exceedingly attractive. The bracts and calyx are both covered with farina. The pedicels are broadly ovate, short and foliaceous, while the purple-tinged calyx is bell-shaped. It is one of the easiest species to grow, as it thrives in almost any soil. (Fig. 25.)

P. carniolica is a constitutionally strong plant, both in its wild state and under cultivation. Its occurrence is restricted to very marked areas in Southern Austria. Under cultivation and given favourable conditions of soil, position, and isolation from a strong sun, it will increase rapidly and produce its beautiful pale lilac and white-eyed flowers in abundance. Its smooth, shiny, and slightly waved leaves are in colour a pretty tinge of green with a cartilaginous margin. They are obovate or oblong in shape, and taper gracefully into a more or less short petiole, obtuse or subacute. They are quite entire. The scape is frequently as much as 8 inches long. The plant should be grown in turf, to which has been added a little leaf mould, in positions where it does not get full sun. (Fig. 26.)

P. viscosa (*P. viscosa* of Allioni and *P. latifolia* of Lapeyrouse) is another strong-growing species. (Fig. 27.) Unlike *P. carniolica*, it is not

confined to a narrow area in its distribution. It is found with a common standard of perfection in all the mountainous parts of Southern Europe, from the Pyrenees to the Rhaetian Alps. As the area of distribution is large, the different districts naturally offer very varying conditions of life, so that in this species particularly the local varieties are extremely numerous and perplexing. The true *viscosa* must not be confused with the *viscosa* of commerce, which I find to be principally made up of varieties of *P. hirsuta*. It is almost devoid of farina. The large leaves are from 2 to 7 inches long and from ½ to 2 inches broad. They are subflaccid, yellowish green, often rather curved, and emit a strong odour. In form the leaves are oval or oblong-cuneate, gradually narrowing into the petiole, either toothed or entire. The surface is densely covered with colourless glands. The scape, from 2 to 7 inches high, carries an umbel of odourless, reddish-violet flowers. The bracts are broadly ovate and the calyx is bell-shaped. There are three forms, only slightly distinguishable from one another.

Forma pyrenaica, from the East Pyrenees. Leaves rather bigger and broader. With big teeth, bearing a great many flowers in umbel.

Forma cynoglossifolia, from the Maritime Alps. Leaves smaller, oval or oblong, entire or slightly toothed. (Fig. 28.)

Forma graveolens, from the Engadine, at a great height. Leaves still smaller, oblong or lanceolate, narrowed towards the base, toothed from the middle to apex.

Subsection (3), **Arthritica.**—The leaves of the plants of this sub-section are firm, tough, shiny, entire and pointed. They have a gristly margin. Thus they are well adapted for an exposed position. By nature they court the full glare of the sun's rays and thrive well under such conditions. The bracts are long and narrow. The calyx is long and the flowers generally rose-coloured.

P. spectabilis has brilliant green, glossy, non-pliant, viscid leaves, with a very pronounced cartilaginous margin. In shape they are oblong or rhomboid-oblong, entire. A very pronounced feature in the architecture of the leaves of this species is the deep pitting easily discernible on their upper surface. This pitting at once distinguishes *P. spectabilis* from the other species in this sub-section. The flower stem stands out well above the leaves and carries a larger or smaller bunch of mauve-coloured flowers. (Fig. 29.)

P. glaucescens (fig. 30) is *P. calycina* of commerce. This is another species of the more vigorous and easily cultivated Primulas. It is found almost exclusively on the southern slope of the Italian Alps. Owing probably to the dissimilar physical conditions under which it is grown in this country, it shows a remarkable variation in size. Under favourable conditions it will produce a flower stem 5 inches long with a leaf almost the same length. The smooth grey sea-blue leaves are lanceolate or narrowly oblong and non-viscid. The cartilaginous rim is of considerable breadth. The flowers are in colour rose, lilac, or

purple. The leaves in *glaucescens* have a tendency to curl inwards, those of *spectabilis* backwards. There are two varieties :

var. *calycina*, with large leaves and large calyx.

var. *longobarba*, with smaller leaves and smaller calyx.

P. Wulfeniana has a rigid, narrowish, pointed leaf, rarely exceeding 2 inches in length. It is intense dark green, non-viscid, and the cartilaginous margin is broad and minutely glandular. In the young state the edges of the leaves have a tendency to curl inwards laterally. The flower scape, about 2 inches high, carries one to three rose-coloured flowers. It is found mainly on the Austrian Alps, where it thrives vigorously and groups itself in spreading tufts. In cultivation its beautiful flowers appear in April. I have found it an easily grown species both on the moraine and in turfy loam.

P. Clusiana is also a native of the mountains of Austria. In cultivation, and like the others in this subsection, it does full justice to any soil and situation in which it may be placed. Its leaves are much lighter in colour than *P. Wulfeniana*. They are ovate or oblong, entire, smooth, slightly stiff and glossy, and the cartilaginous margin is narrow and ciliated at the edge. The flower scape varies from $\frac{3}{4}$ to $4\frac{1}{4}$ inches in length, and carries an umbel of one to six rose- or lilac-coloured flowers. The corolla lobe is bifid, not emarginate, as in the case of the other three species of this subsection. Fig. 31.)

Subsection (4), **Erythrodrosum,** contains six species. They all have the distinguishing characteristics of fleshy leaves without farina, but covered with pilose glands, from which issues a reddish viscous exudation. Bracts short, not long, as in the previous subsection ; flowers rose or purple. They have a somewhat wide alpine distribution.

P. pedemontana, from the Graian and Cottian Alps. The leaves are in shape obovate or oblong-lanceolate, entire or dentate, gradually diminishing into a petiole. They are glabrous or very slightly glandular, but the margin has a dense short reddish ciliation. In length they are from $\frac{3}{4}$ of an inch to $2\frac{3}{4}$ inches, and $\frac{1}{3}$ to $1\frac{1}{3}$ inch broad. The glandular flower scape, about 6 inches in length, carries an umbel of flowers of a beautiful rose colour, sometimes with a white throat. The tubular calyx is glandular, with slightly cleft triangular lobes.

P. apennina, as its name implies, is found in the Apennines, but seems to be confined to the northern part of the range. It is a plant that at present few gardeners are furnished with. The leaves are about 2 inches long, ovate, oblong, or lanceolate-cuneate, narrowing gradually or suddenly into a petiole. They are either entire or slightly toothed towards the apex and covered densely with large yellowish brown glands.

P. oenensis (fig. 32) comes from the west Rhaetian Alps. It is at present not much known to commerce. The leaves are roughly cuneate, gradually tapering into a petiole, very viscid, densely covered with

large red glands, anterior margin slightly toothed, never entire. Scape with an umbel of one to seven flowers. Corolla rose-coloured, throat white.

P. villosa is a species that inhabits the Eastern Alps. The leaves are densely covered with red glands and very sticky. They are broadly obovate or oblong, or oblong-lanceolate gradually or suddenly tapering into a petiole, obtuse, fairly regularly toothed from the middle, but sometimes entire, the pubescence being longer than in the previous species. The scape, about 6 inches high, is covered with red glands. The flowers are lilac or rose. (Fig. 33.)

P. commutata is a variety of *villosa* from Steiermark, with thinner and bigger leaves, often oblong and often coarsely toothed.

P. cottia is somewhat exclusive in its distribution, being found only in widely divergent parts of the Cottian Alps. The leaves are sticky, obovate or oblong-lanceolate, more or less obtuse, denticulated from the middle, but occasionally entire and densely covered with red glands. The scape, calyx, and corolla are glandular. The scape is from 2 to $4\frac{3}{4}$ inches and bears from 2 to 12 rose-coloured flowers. It is more like *villosa* than *hirsuta*. (Fig. 34.)

P. hirsuta (fig. 35), the last to be treated in this subsection, is a species that grows in the Apennines, the Pyrenees, the Central Alps, and the Dolomites. It is frequently grown in the garden under the name of *P. viscosa*. The leaves are very sticky, and covered with yellow, sometimes reddish glands. They are broadly obovate or rhomboid, rarely subcuneate, tapering rapidly into a petiole, obtuse. Sometimes the whole margin is coarsely toothed, but occasionally only from the centre. The glandular scape is short, often indeed shorter than the leaves, and is unlike *viscosa* in this respect. It bears an umbel of flowers which may be lilac, rose, or white. Some of the forms are really exquisite.

Var. *angustata*. Leaves oblong, gradually narrowing into a petiole. Flowers rose-coloured.

Var. *exscapa*. Flowers nearly subsessile ; scape short or absent.

The varieties known as *ciliata* 'The General,' *coccinea*, and *Balfouriana*, and also the form known as *nivea*, are cultivated garden forms of this species.

The characters of the different species in this subsection are so slightly different in many cases that I am inclined to think they should be regarded as only geographical varieties of a single species. But I speak with deference in the presence of the learned Thebans.

Subsection (5), **Rhopsidium.**—The plants of this subsection are destitute of farina, the bracts are long, leaves fleshy denticulate, covered with glandular hairs and colourless exudation.

P. Kitaibeliana. The leaves are slightly yellow and intensely odorous, densely covered with colourless glands, sticky, from $1\frac{1}{2}$ to 3 inches long, and from $\frac{3}{4}$ to $1\frac{1}{2}$ inch broad, slightly glaucous, in shape elliptical or oblong-lanceolate, gradually narrowing off into a long petiole, acute or obtuse. The scape, 1 to $2\frac{1}{2}$ inches high, is shorter

than the leaves, and carries a one- or two-flowered umbel of rose or lilac flowers with white throats. It is found in the Illyric Alps and other parts of the Balkan Peninsula.

P. integrifolia (fig. 36) has the leaves entire, rather shiny, with a few small clear glands, no cartilaginous margin, hardly sticky, ciliated, elliptical or oblong in shape, almost sessile, more or less obtuse. The reddish scape is one or two inches high, and carries an umbel of one to three rosy-lilac flowers. I find this plant quite easy to grow, but it does not always flower satisfactorily. It comes from the Pyrenees and Middle Alps.

P. tyrolensis. (fig. 37) has leaves of vivid green, densely glandular, sticky, and having an unpleasant odour on being pressed. They are small, about an inch in length, round or broadly ovate, drawing abruptly to a very short petiole. The apex is rounded, and minutely toothed. The scape, about the same length as the leaves, carries an umbel of from one or two large lilac-rose flowers with white eyes. It is found in the Dolomites, on rocks and stony expanses.

P. Allionii is found in cracks and crevices on hard limestone cliffs, in positions exposed to the sun, and in shallow sunless caves between Cuneo and Nice, where neither sun nor rain reaches it. The plant is of small habit. The leaves are from one to a little over two inches in length, rounded or oblong, or oblong-cuneate, thick; soft green in colour, somewhat oily, thickly covered with colourless glands, and intensely sticky. The margin may be entire or very slightly dentate. The flower scape is very short, being barely perceptible. It bears an umbel of from four to seven flowers of very large size, considering the dimensions of the plant, and of a varying tone of colour. The variation ranges from deep rose pink with a white eye to a faint flesh colour. The large flowers, which come out in succession, one or two at a time, lie almost flat on the cushion of leaves. It is certainly difficult to grow in the open, but if its natural conditions are imitated the task becomes comparatively easy. It is imperative to plant it in soil adapted to its nature. The most suitable places are an expanse of gritty calcareous loam or a crevice in the rockery in a piece of soft tufa in a perpendicular position. It grows and flowers freely with me in a small cave facing west, where very little sun reaches it and rain practically never, which goes to prove that it must throw its roots out to a considerable distance so as to get the moisture necessary for its existence. As a pot plant *P. Allionii* does well, the pot being plunged in sand to the rim or within $\frac{1}{4}$ of an inch of it and kept in a frame. It does best shaded from the sun. The plant may be increased by division or by cuttings taken in summer. The cuttings strike fairly easily in silver sand in a cold frame if kept close and shaded. (Fig. 38.)

Subsection (6), **Cyanopsis**.—Only two species come under this subsection, namely *P. glutinosa* and *P. deorum*. They have blue-violet flowers. The leaves are sticky, fleshy, crenate, serrate, glabrous. The bracts are long and foliaceous.

P. glutinosa is a very beautiful sweet-smelling deciduous species that flourishes and flowers freely where it grows wild in marshy ground, but under cultivation my experience is similar to that of CLUSIUS, the greatest botanist of his time, who lamented his ill success with it. In the rockery and also in the moraine it comes up year after year, but flower it will not. The leaves are sticky; in shape lanceolate-cuneate or oblong-lanceolate; obtuse. They are erect, stiff and smooth, toothed from the middle upwards. This species is found in the Central and Tyrolese Alps.

P. deorum. From the name one would imagine this species to surpass all other Primulas, but this is far from being the case when the plant is under cultivation. It is difficult to grow, and does not well uphold the reputation of its name when in flower. The leaves are from 3 to 4 inches long, ½ an inch broad, rather coriaceous and stiff with a cartilaginous margin, oblong or lanceolate, quite entire, and acute. The scape, about 6 inches in height, is sticky and darkly coloured in the upper part. It has an umbel of from five to ten flowers, all carried on one side. The bracts are oblong, linear. Calyx sticky, blackish green, cleft to the middle with acute triangular lobes. It is said to be a bog plant and a native of Bulgaria. (Fig. 39.)

Subsection (7), **Chamaecallis.**—This subsection only contains one plant, the small but well-known *minima*, one of the most exquisite gems in the genus (fig. 40). It is found in the limestone and granite mountains of Austria and the Balkan Peninsula. The firm smooth leaves are little over ½ an inch long, with no cartilaginous margin. In shape cuneate, abruptly truncate, and serrate at the apex. The scape is short, carrying one to two large rose-coloured flowers with white eyes. There are several forms:

forma subacaulis. The scape and leaves shorter.

forma caulescens. With rose flowers.

forma alba. With white flowers.

forma fimbriata, which gets its name from the fringed and deeply incised corolla lobes.

CULTIVATION.

I have so far been dealing with the chief characteristics of the European Primulas, but before concluding I should like to say a word about the conditions under which they thrive best in cultivation, for after all that is the most important part of the subject to those who wish to deal with them, not as botanists, but as horticulturists. From what I have already said of their distribution you will have gathered that these plants are all naturally hardy, and I may here add that they are all more or less amenable to pot cultivation. At the same time, if they are to prosper and remain healthy, they demand certain physical conditions which I may summarize as:—

Firstly.—Plenty of air.

Secondly.—A moderate amount of sunshine.

Thirdly.—Abundance of moisture in spring and summer.

They should, however, be kept fairly dry during the winter, and, *lastly*, but most important, they must have ample drainage. With these essentials to success I will deal as briefly as possible.

Essentials to Success.—All the species in section *Vernales* should be grown in good rich soil, and though they do not object to sun they must not be parched. My experience is that plants grown in partial shade are generally the most vigorous.

In section *Farinosae* all the species do well in loamy soil or in a cool moist part of the moraine.

To come to the strictly alpine species, I find that *Primula Auricula* does well in loamy soil, while in moraine soil it keeps dwarf, which is of course its natural habit.

Primula Palinuri, as I have already said, does best as a pot plant kept in a cold frame.

Primula marginata with me thrives well anywhere, and I should look upon the gardener as a kind of curiosity who fails with it.

Primula carniolica I grow in pure pulverized meadow loam in a shady position, and so treated it increases quickly and flowers freely.

Primula viscosa flourishes in the same soil as *carniolica*, but prefers a much sunnier aspect. It also is easy to grow.

Primula spectabilis does well with me in loamy soil, in half shade.

Primula glaucescens, *P. Wulfeniana*, and *P. Clusiana* grow profusely in loamy soil and also do well in the moraine, where, however, they do not attain to such a large size. They do well both in sun and in partial shade.

P. pedemontana, *P. oenensis*, *P. villosa*, *P. cottia*, *P. hirsuta*, *P. Kitaibeliana*, and *P. integrifolia* I also grow in loamy soil with a southern exposure. They need to be carefully watched and seem to like frequent lifting and division. Like wives and sweethearts, they resent neglect.

Primula apennina I grow in loamy soil, but it is a plant with which I have not had much success. Whether it deserves the trouble it has given me I should not like to say.

Primula tyrolensis and *P. Allionii* are both very saxatile plants. *Primula tyrolensis* does well in moraine facing west and is fairly easy, but *P. Allionii* is much more difficult and does best in calcareous soil in a sunless cavern. It is worth any amount of trouble, for it is a really charming flower. It is a subject well suited for pot cultivation in a cold frame.

Primula glutinosa and *P. deorum* I always grow in moraine, but with different aspects, *P. glutinosa* facing south and *P. deorum* in a half shade. But *P. glutinosa* suffers from home-sickness or temper, like so many beauties, and resolutely refuses to flower—coax and wheedle it as you may.

P. minima does best in moraine facing south-west, but is an accommodating little plant, and is quite happy so long as you pay it a decent amount of attention.

As pot plants I grow all with the exception of *P. Allionii* and

P. Palinuri in soil composed of two parts of loam, two parts peat, one part sand, and one part leaf mould, well broken down, mixed together and allowed to lie for some considerable time before potting. They are plunged in sand, which prevents stagnant moisture remaining about their roots, a condition fatal to their well-being. Sand is also cleanly and does not harbour slugs in the same way as clay and ashes do. The pots should be plunged in an open position in half sun, and exposed to all weathers, except during the hottest days of summer, when they are all the better for a little shade.

Firm potting is imperative, and I have the idea that the admixture of a liberal allowance of broken crocks is helpful.

Finally, to keep them in vigour I repeat they should be treated as other perennials and divided frequently. This is best done immediately after flowering, but may also be effected in early spring, when root action is commencing.

Discussion.

The Chairman: Before I move a vote of thanks to the Lecturer, I will invite any members of the audience here to ask any questions, or make any remarks, on the interesting paper we have heard. I can only say that I have listened with the very greatest interest to this paper, knowing somewhat about Primulas, especially these European species in their own native habitat, and I think the lecture to which we have just listened was full of interest. In every single instance which I have been able to follow—because, of course, the lecturer has gone further than I have in my special knowledge—he has been most accurate and most instructive.

No questions being asked or remarks made, the Chairman called on Mr. R. Farrer, F.R.H.S., to read his paper on

'PRIMULA HYBRIDS IN NATURE.'

Mr. R. Farrer: I must preface my remarks with the warning that they are obviously the observations of a field-botanist only, and, even so, of partial and limited scope. For I propose to deal especially with such crosses as I have studied *in situ* for myself, and my experience is as yet not nearly complete, nor by any means commensurate with my ambitions. Even personal inspection of a cross on some particular mountain conveys no authority to speak as to its habits throughout the range of its distribution; and for exhaustive knowledge of these we must go to such fortunate field-botanists as live in or near the Alps, and can therefore beat up whole ranges for their game, as against the occasional specimen that an Englishman on tour is able to flush in a flying visit to some indicated ridge or slope.

First of all, not to trench excessively on ground appropriate to others, I must briefly point out the territories occupied by each species,

FIG. 36.—PRIMULA INTEGRIFOLIA, Linn.

FIG. 37.—PRIMULA TYROLENSIS, Schott

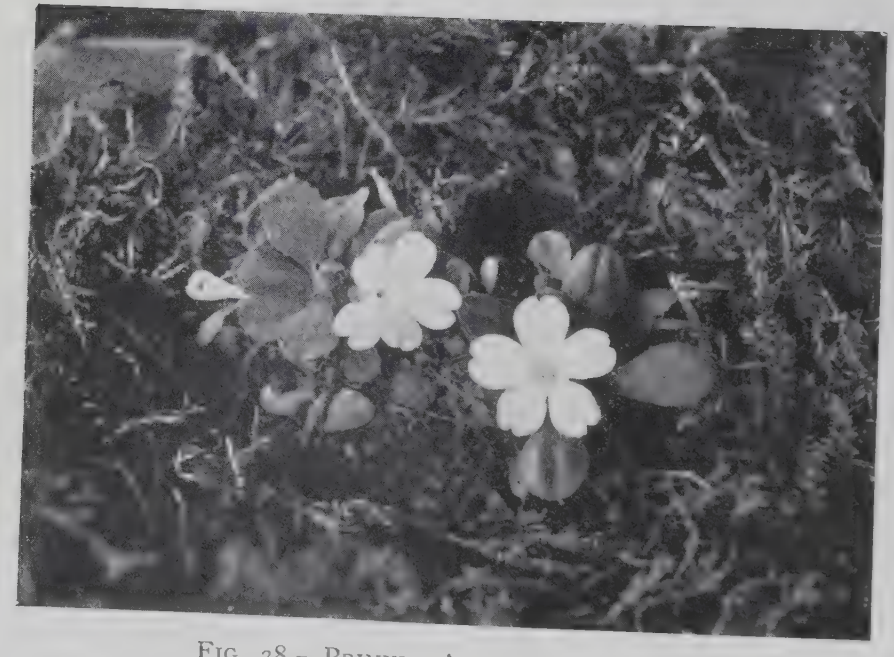

FIG. 38.—PRIMULA ALLIONII, Loiseleur

FIG. 39.—PRIMULA DEORUM, Velen

[*To face p.* 112.

FIG. 40.—PRIMULA MINIMA, L.

and where it overlaps with the rest, that thus you may gather a clear notion of where hybrids (the word is incorrect of crosses within the same race, but is now of such general currency that one can hardly avoid the occasional use of it) may be looked for and expected. And here I may mention one or two guiding rules that seem to hold good. The first appears to be that, in *Primula*, crosses between species of different sections (not subsections) are of occurrence so rare and problematical that most quotations of them may almost be regarded as mythical. For instance, *P. longiflora* and *P. farinosa* will not interbreed with any of the twenty-one species belonging to the great section Auricula (*longiflora* × *officinalis* has been quoted, but is doubtful). Again, crosses between species in the same subsection are extremely rare, though this rarity, no doubt, is only owing to every Primula's dislike to sharing its district with any relative of the same subsection; for where at last, very occasionally, such invasion is tolerated, and *hirsuta* overlaps upon *oenensis*, *glaucescens* on *spectabilis* —there at once, though rarely recorded, may occur the first-cousin-born crosses, *P.* × *Seriana* and *P.* × *Carueli*. Crosses in the subsections of the section Auricula are, as we shall see, abundant, but in the section Farinosa, which has no subsections, *farinosa* and *longiflora* apparently decline to interbreed; for, though a cross has been cited, the occurrence is so uncertain and unique that the plant described (*P.* × *Kraettliana*, Brügger) is best taken as a form of *longiflora*.

The two most prolific parents in the section Auricula are undoubtedly *minima* and *Auricula* itself, as having the widest range. That range must therefore now be considered. *P. Auricula* is practically universal throughout the whole Alpine chain, Upper and Lower Austria, and far away to the East; by strong preference a plant of the limestone Alps, and varying infinitely in its forms, from huge *P. Auricula Bauhini* to brilliant little golden *P. Auricula ciliata* of the Dolomites and southern limestones. In the Graian, Cottian, and Maritime ranges I believe it to be less common (it does not, for instance, meet *P. pedemontana*); anyhow in your mental map of Europe you may colour all the chains with the citron-yellow of *P. Auricula*. Its affinities are almost wholly with the Erythrodosum subsection, headed by *P. hirsuta*, for though it incessantly overlaps all four of the Arthritic Primulas, *glaucescens*, *Wulfeniana*, *Clusiana*, and *spectabilis*, nowhere does any cross result, although Gusmus (who seems to attribute the wildest hybrid origin to any plant that catches his attention, and has crammed the columns of Pax and Knuth with *nomina nuda* and *nomina incerta*) has tried to claim *P.* × *admontensis*, Gusmus, as a cross between *Auricula* and *Clusiana*, the said plant possessing, according to Pax, not a single characteristic of *Auricula*, nor a single deviation from *Clusiana*. Stein and Kerner have also cited an *Auricula ciliata* × *spectabilis*—a plant barely described and never again beheld. With *minima* again, and *marginata*, *Auricula* seems barren, for, in spite of countless opportunities, no offspring results.

In Switzerland however, and especially in the Engadine, its most southerly corner, *P. Auricula* finds a happy mating-ground; for Switzerland, so poor in Primulas, yet provides two at least that are to the taste of *P. Auricula*. Almost universal, though usually non-calcareous in its tastes, is *P. hirsuta*, All. (1785) (the false *P. viscosa* of gardens and catalogues). And hence springs an endless and inextricable series of hybrids—with which I am not here to cope, as I have never yet ranged the districts occupied by *Auricula* and *hirsuta*—that is, the whole main chain, at least as far as the Voraarlberg. This cross is indefinitely fertile, too, breeds backwards and forwards again, in and out to the *n*th generation, steadily increasing, also, in magnificence, till from this are ultimately developed all the Auriculas of the florist and the border, since CLUSIUS first in 1573 saw them in the gardens of his medical friend Dr. JOHN AICHOLTZ of Vienna, and sought them in vain over the highest ranges of Austria and Styria, but understood them to be known in the Oenipontine Alps. This cross, and its further results, are universal in Switzerland; and, setting aside the florist, the rock gardener has hard enough work with disentangling all the confused names of the countless 'Alpine Primulas' that oscillate between *hirsuta* and *Auricula*. The proper, sole name for the whole enormous range of them, no matter how they vary, is *P.* × *pubescens*. But here follows a list of garden and catalogue titles that should now be discarded (for it would be far better, in most special cases, to give a fancy name such as that of 'Mrs. J. H. Wilson' or 'The General,' which have been put to certain forms of *pubescens*—though under the false specifics either of *P. ciliata* or *P. viscosa*), *P. Arctotis*, *P. Kerneri*, *P. Göblii*, *P. rhaetica*, *P. alpina*, *P. helvetica*, *P. ciliata*, *P. nivalis*, and *P. alba*. More than this, there are in cultivation certain obscure and old forms clearly originating between *Auricula* and *viscosa*, *Auricula* and *villosa*. (One special albino I possess, found in some cottage border, which is clearly *Auricula* × white *viscosa*, a handsome thrifty plant, with precisely the tall stem, nodding umbel, and narrow flower of *P. viscosa*.) And both these crosses, *Auricula* × *viscosa* and *Auricula* × *villosa*, are submerged by PAX, following WIDMER, under the name *pubescens*, applying *only*, in honesty, to *Auricula* × *hirsuta*. I can but regret the weakness which has left two such important crosses without any official separate recognition. Even if the task of unravelling the primary, secondary, and tertiary generations from *Auricula* be too vast to allow of any clear definitions of parentage, yet there should at least be names, even if they be only *nomina nuda*, to express the abstract idea of two crosses so specific as *Auricula* × *viscosa* and *Auricula* × *villosa*. It may fairly be claimed, indeed, that in all branches of gardening few plants have so ancient a pedigree and so august a horticultural history as the vast new race aboriginally sprung from *P. Auricula*, dividing from its sources into a thousand forms and an infinite variety of colours each more brilliant than the last. But *P. Auricula*, in all its crossings—keeps, like the late Imperial House of China, its own Imperial yellow for itself. The

offspring are of every other colour in the range of Primula, but never yellow : until indeed *Auricula* has bred them back again towards itself again and again, until their blood is practically pure *Auricula* once more.

Compared with *P. pubescens*, the other crosses of *P. Auricula* are rare, unimportant and obscure. In the Alps of Belluno the var. *ciliata* meets *P. tyrolensis*. Two specimens of a mule were once recorded ; their description approximated them to *P. Auricula*, but no one except HUTER ever saw them, nor have they been heard of since. Again, on the high moors of the Engadine *Auricula* meets *integrifolia*, and *P.* × *Escheri*, Brügger, is the result. But *P.* × *Escheri* is very rare, nor does it sound very desirable. The intense colour of *P. hirsuta* is able to grow yet intenser with the conquered gold of *P. Auricula* ; but the lymphatic lilacs of *integrifolia* and *oenensis* have to strike a compromise ; and the result is a series of dim, pallid, and washy tones, muddy and indeterminate. *P. oenensis* is a species near *hirsuta*, but of pallid colour, and is found only on the Rhaetian extremities of Switzerland, along the Ortler group, and down into the Alps of Giudicaria, above the Lake of Garda. Here it meets *P. Auricula*, and here, last spring, I came upon the first and only plant I have found, or wish to find, of *P.* × *discolor*, Leybold (*P. Portae*, Huter), for I am glad the name *discolor* has priority ; the plant is a larger, spoiled *oenensis*, the colour feeble and dull, with a blurred yellowish throat. Yet at the same time I admit there may be better forms. One is too apt to think that plants of a cross must all be cut rigidly to one pattern, whereas one allows at once that there may be endless diversities of form and colour among the species from which they spring ; all the more reason, therefore, that such diversities should naturally and inevitably continue in the hybrids also. None the less *P. oenensis* is a species so comparatively dull in its class (it has to compete with *hirsuta*, *villosa*, and *pedemontana*) that I cannot think its offspring would ever have high value, especially when contaminated by a strong yellow. For the last cross of *P. Auricula* you have to travel far, far away into a land where they speak a jargon inconceivable by man, in words of twenty syllables made up of X's and Z's. For here, lonely upon its wooded hill-tops in the Idrian ranges, sporadically occurs the rare and glorious *Primula carniolica*. And here is found a cross between *carniolica* and *Auricula*, which is strangely well-known in catalogues (if they speak sooth) as *P.* × *venusta*. Last August I ascended Jelenk, *venusta's locus classicus*, whence it draws the later name of *P. Jelenkae*, but, though I hunted sedulously, I wholly failed, not only to find the cross, but also to see any trace of *P. Auricula* itself. *P.* × *venusta*, in any case, would be almost impossible to discover out of flower ; it has all the habit of *P. carniolica*, but its leaves and calyces sometimes inherit more or less of *Auricula's* white farina. But the fragrant flowers are of a red, reddish, or brownish rose or purple. The plant is fertile of secondary crosses, and, pollinated by *P. marginata*, has yielded the beautiful

P. × '*Marven*,' so close in habit and style to the purple *pubescens* called *decora*. All these hybrids, of course, have the splendid constitution of *P. Auricula*.

But the most wholesale parent in the race (a seed-parent usually, while *Auricula* gives seed as freely as it takes it) far exceeding *Auricula* in promiscuity, though not in the general horticultural importance of its children, is *Primula minima*. *P. minima* is not a Swiss plant, nor at all a species of the Western, Southern, or Central Alps. The Brenner range marks its furthest westerly extension, and the Alps round the Adamello and the Pala group the extremity of its distribution into S. Tyrol and Giudicaria. But thence it ranges eastward, over lime and granite indifferently, in enormous abundance over all the high turf of Tyrol, Salzburg, and the Styrian limestones, far away into Thrace, Servia, and Bulgaria. Thus, in the Hohe Tauern, *minima* meets *villosa*; on the Styrian Alps S. of Vienna, *Clusiana*; on the granites of the Brenner, *hirsuta*; on the limestone of the Pala Dolomites, *tyrolensis*; to the East, again, in the Karawanken, *Wulfeniana*; and at its most southerly and westerly point, on the Alps of the Frate di Breguzzo in Giudicaria, under the Adamello, it just contrives to catch an outpost of *spectabilis* and *oenensis*. And everywhere throughout the Austrian Alps, as far south as the Rolle Pass, it shares whole miles of granitic moorland with *glutinosa*.

All the hybrids of *P. minima* are of the utmost use and interest. It is among them that my experience has so far mostly lain. It was in 1911 that my attention was first challenged by them, and in August though the flowers were long since over, I was able to discover *intermedia*, *Juribella*, *Kellereri*, *Forsteri*, besides the whole series, in brilliant bloom, of the *minima* × *glutinosa* range from *salisburgensis* to *biflora*. So easy are the crosses for a fairly well-trained eye to hit upon; many may be the different breadths and shapes of leaf among types of the species, but the look of an intermediate is never to be mistaken—no, not even amid the colossal-foliaged minimas of the Brenner group, where I toiled for hours over the slopes before suddenly in an instant I saw the rosettes of *Kellereri* and *Forsteri* growing side by side beneath my eye. There need be no strain or ἀκρίβεια about the search; doubt may often cross the searcher's mind while he is yet hunting the hybrid; never when once he sets eyes on it.

It will be noticed that *minima*, almost universal in its alliances (it spurns *Auricula*, but I have little doubt that Illyria will yield a cross between *minima* and *Kitaibeliana*), has the further luck of sharing ground with three out of the four magnificent Arthritic Primulas, perhaps the most gorgeous and valuable in the whole race. One would expect a splendid result in dwarf, huge-flowered, mat-forming, profusely-growing Primulas. Unfortunately, except in one case, these anticipations are not realized. While the best forms of *minima* have beautiful round blossoms of ample outline and sound texture, there are vast multitudes with feeble, thin and starry shape, thin and feeble also in their texture. And these it is that have mostly

perpetuated themselves in *P.* × *Facchinii*, *P.* × *Dumoulini*, *P.* × *Juribella*, *P.* × *Deschmanni* (in both its forms, *serratifolia* and *vochinensis*). This last I have not yet collected (*minima* × *Wulfeniana*; in Carinthia and the Karawanken), but this season brought me disappointment when I revisited the haunts of *P.* × *Juribella*, Sündermann, to see it in flower. This inhabits the high limestones north of the Rolle Pass, where *tyrolensis* in masses shares the crevices with *Campanula Morettiana*, and *P. minima* occupies the highest banks and ridges in company with its offspring (which is clearly *minima* × *tyrolensis*, and much closer to *minima*). But while, from *minima*, *P.* × *Juribella* inherits a thin and floppy outline, from *tyrolensis* it has drawn, not the splendid amplitude of blossom, but the rather aniline and virulent tone of colour that is the one fault to be found with that exquisite brother of the even more exquisite (and so far, childless) *P. Allionii*. One has to hunt long before one comes upon outstanding forms of *P.* × *Juribella* (*tyrolensis* itself seems to vary comparatively little), and the plant, though easy of culture, and very brilliant, has not altogether the fullness of charm that one might have hoped. Much more noble are the crosses of *minima* and *spectabilis*. As it is impossible to render aloud the shades of influence described in the Vienna Conference's new and much more sensible rule for the definition of crosses (as *P.* × *minima* < *spectabilis*, *P.* × *minima* > *spectabilis*, and so on, to denote the precise degree of prevalence in either parent) I will continue, for the sake of clearness, to use the Paxian names of *P.* × *Facchinii*, Schott, and *P.* × *Dumoulini*, Stein, for this cross, of which *Facchinii* more nearly approaches *minima* and *Dumoulini*, *spectabilis*. These occur only in the very small district of Mid-Giudicaria where *minima*, *spectabilis*, *oenensis*, and *Auricula* meet. On the high ridge of the Frate di Breguzzo in early June, with snow still lying deep over the classical Magiassone Alp down on the northern side of the Col, some hundred yards of arête, and those hundred yards alone, were ablaze with *minima*, *Facchinii*, *Dumoulini*, and a few rare *spectabilis* (with *P.* × *discolor* occurring in one specimen, and *P.* × *coronata* hardly less rare).

Nothing indeed is more curious and striking, I think, than the extremely local occurrence of these minima crosses. Their parents may carpet all the hills; the hybrid will be found in one or two very circumscribed spots. And those spots, it is odd to notice, will very generally be on a high exposed arête or pass. Though the whole of the Hochschneeberg be a garden of *minima* and *Clusiana*, it is only upon one small patch on the ridge of the Kaiserstein that my utmost search has been able to discover *intermedia*; it is to one steep slope that *Juribella* adheres; it is on a sharp high crest that *Facchinii* and *Dumoulini* abound. They are beautiful little Primulas, brilliant in colour, neat and compact in their ramifying tufts. Yet *minima*, though it has not been able quite to counteract the opulent splendour of *spectabilis*, has infused a certain thinness of texture and starriness of form here also; and into the clear and lucent rose-pink of

spectabilis has crept an aniline touch from the less pure and vivid colour of *minima*. Here again, though, forms do vary, and search will procure one intensely rosy hybrids, solid-flowered after the orbed and hearty beauty of *spectabilis*. The rarer of the two crosses is *minima* > *spectabilis*, *P.* × *Dumoulini*, much the closer to *minima* and yet cosier in its habit, rounder in the single bloom it carries close to the ground on an invisible scape, than is *minima* < *spectabilis* or *P.* × *Facchinii*, much nearer to *spectabilis*, but rather ragged in the blooms it carries by pairs (sometimes by threes, even as the generally uniflorous *Juribella* occasionally carries two blooms) on a scape of an inch or so. It will be noticed that in all these crosses it is clear that *minima* is invariably the mother. I know no Arthritic hybrid which suggests that *minima* has been the fecundating parent until we come to the next cross, the last and most gorgeous of this section. For *P.* × *intermedia*, Portenschlag, alone of this cross-bred race, seems to inherit the best qualities of either parent, and carry them to a higher power. It has a neat compact habit of tufted, spinulous-looking rosettes in a single clump, derivable from *minima*, though much larger, and it also has the taller scape and the enormous, brilliant rosy blossoms of *Clusiana*, unspoiled and unweakened. It is a most beautiful and recommendable plant on all counts, for where the other Arthritica × Chamaecallis crosses are easy enough to grow, *P.* × *intermedia* is not only as hearty and thrifty as a cowslip, whether in moraine or loam or peat, but it is also among the most free-flowering Primulas that we possess. It has a curious tendency to throw roots along the surface of the ground with me—perhaps a reminiscence of minima's roving habits. And *P.* × *intermedia* is, to my thinking, quite definitely *Clusiana* × *minima*, a clear cross of *minima* on to an Arthritic Primula, instead of by one. Close by, however, to the one little patch of a few square yards on the Hochschneeberg where alone I have collected *P.* × *intermedia* (and its forms are diverse, in length and breadth and even in dentation of leaf; for sometimes you come on larger developments, in which—unless they be in flower, and I have never yet seen wild *intermedia* in flower—only a rare jag or two round the leaf's end remains to remind you that you are not looking at pure *P. Clusiana* in some diminished version) there is also a large colony so radically different in style and habit from *intermedia* that here I believe the variation is specific, and that this is the reverse-cross, *minima* × *Clusiana*. Of its flowers I cannot yet speak, but the plant is very much smaller than *P.* × *intermedia* and in foliage recalls *P.* × *Dumoulini*, though perhaps a trifle larger; even as its habit of growing in wide, dense mats and ramifying colonies stands towards minima's carpet-habit very much as do the laxer ramifying tufts of *P.* × *salisburgensis*. This also seems, as so often, to have spread from its original focus over a small space of moor; and elsewhere, as I have said, you may tramp the Styrian limestones across many a springing mile of *Dianthus alpinus*, *Campanula alpina*, *Viola alpina*, *P. Clusiana* and *P. minima*, and *Petrocallis pyrenaica* without ever setting eyes on *P.* × *intermedia* or any other

cross between the two. There is, meanwhile, that *nomen incertum* of GUSMUS, *P.* × *admontensis* which he quite baselessly ascribes to *P. Auricula* × *Clusiana*. This from its description I take to be merely pure *intermedia* (which I believe to be sterile, as its authorities say). Otherwise the name must be referred to some other *Clusiana* × *minima* cross, differing in size (for it sounds to be apparently a jag-leaved *Clusiana*—in other words, simply a fine *intermedia*). Otherwise we might apply its name to this second cross of mine, *minima* × *Clusiana*, which carries rarely more than two blooms to a stem, and differs from *intermedia*, too, in being clearly fertile. Failing, however, of any more authoritative name, and as the plant is too distinct from *P.* × *intermedia* to be left under its name, or differentiated with a mere blank, I will here distinguish it for convenience as *P.* × *caesarea*, Farrer (from the ridge where it occurs). Neither *Clusiana* nor *minima*, it appears in point of fact, has any breeding use for *P. Auricula*, which covers all the stony places on the Schneeberg but is nothing regarded.

We now come to the crosses between *minima* and the Erythrodosum subsection. *Minima* meets *villosa* along the granitic Eastern Alps of the Hohe Tauern, as far as the Eisenhut. The resulting cross, *P.* × *flatnitzensis*, Gusmus, divides, like *P. minima* × *spectabilis*, into two marked extremes, *P.* × *Sturii*, nearer to *villosa*, and *P.* × *truncata* to *minima* (*minima* < *villosa* and *minima* > *villosa*). *P. villosa* is however the one species of the main European Alps upon whose territory I have never yet set foot. Therefore of this hybrid I can say nothing; nor have I any knowledge from experience at home, *P.* × *flatnitzensis* being apparently rare in cultivation. *P. minima* again, as you will have guessed, just touches pale *oenensis* (as well as *spectabilis*) on the pass of the Frate di Breguzzo, where in twenty yards you have under your hand four species, *minima*, *spectabilis*, *oenensis*, and *Auricula*, with at least five named hybrids—× *Facchinii*, × *Dumoulini*, × *discolor*, × *pumila*; and × *Widmerae*. These last are the two branches of the *minima* × *oenensis* cross (*P.* × *coronata*, Porta), *pumila* being *minima* > *oenensis*, and *Widmerae*, *minima* < *oenensis*. Of this latter I could see no specimens, but *P.* × *pumila*, though of rare occurrence, seemed a very charming plant, minutely neat in habit, with round rosy flowers, two to a scape, flat upon the ground as in *minima* itself. So much, then, for these. I must mention that in these notes I am not attempting to burden either readers or hearers with close botanical descriptions of these crosses, nor with analyses of cases in which a reverse cross seems likely; all such information will be found treated at sufficient length in my articles on the subject in the *Gardeners' Chronicle* for 1912.

Finally, we come to the most important *minima* cross that I know, after the unrivalled *P.* × *intermedia*. It is only on the granitic ranges round the Brenner that *P. minima* meets that universal granitic alpine *P. hirsuta*, All. (1785) (*P.* '*viscosa*,' Vill. (1787) and of garden catalogues, and many who should know better) which trenches hardly further east than the Gross Glockner (Eschmann) on the territory of *P. villosa*.

And *P. hirsuta*, with the one exception of *P. pedemontana*, is probably the most gorgeous of its section, as (under the false name of *viscosa*) it is certainly the most general in cultivation. Accordingly the cross that results is one of unexampled splendour, *P. hirsuta* seeming able to communicate a glowing corrective of colour, and an undiminished solidity of form and texture, such as we are disappointed not to find imposed on *minima* by the apparently even more dominant and magnificent *spectabilis*. The type-name of *minima* × *hirsuta* is *P.* ×*Steinii*, Widmer, and from its many and subsequent shades and intershades, crossings and re-crossings (for these plants are fertile) stand out superbly *P.* ×*Bilekii* (as I believe, though I have never collected it), *P.* × *Forsteri*, Widmer (*minima* > *hirsuta*), and *P.* × *Kellereri*, Widmer (*minima* < *hirsuta*). These crosses are of unparalleled splendour, perfectly dwarf, almost as much so as *minima*, but with flowers larger, wider, and more solid than those of either parent, and of an almost startling intensity of rich red or pink. This, of course, is true of the best forms only; the names can never be taken as fixed rigidly on any one development, and I have seen types called *P.* ×*Kellereri* and *P.* ×*Forsteri* that are pale and starry by comparison with the huge-flowered claret-crimson plant I have long cherished as *P. Kellereri*, and the expansive glowing great stars that classically belong to *P. Forsteri*. This last, but for the size of its flowers, and a certain unmistakable different look in the leaf (owing to a minute legacy of glandular dots and oval-shaped end from *hirsuta*), is apparently a gigantic *minima* with two or three flowers to a minute scape; *P. Kellereri* is ampler in leafage, darker in its green, more glandular, and altogether approaches rapidly towards *hirsuta* on its smaller scale of growth and larger of flower. Unfortunately these crosses seem extremely rare. I have no doubt that they are to be found wherever the two possible parents meet in the Brenner district (I do not know of records for them from the Hohe Tauern—nor indeed have ever verified the record of *P. hirsuta* round the Gross Glockner, despite my searches). Yet their clumps are isolated in each station, and of painfully infrequent occurrence. In one *locus classicus* I could only discover a single tuft of *Forsteri*, one clump and one single rosette of *Kellereri*, in two hunts that covered a mile or more of mountain slope. For one thing, the parent species do not grow actually together; *minima* covers the moorland turf by the acre, but *hirsuta* hugs the rocks and precipitous gullies of the descending streams; if ever it attempts a lodgment above on the moor (though much larger, it is softer in nature than *minima*, and has not *minima's* leathery imperturbability that quietly occupies a whole tussock to the destruction of all competitors) it is usually in feeble, banished-looking specimens, not of sufficient force for successful breeding. Consequently, intercourse is not so easy as where *minima* shares the open hill with another species, as, for instance, with the Arthritic Primulas and *P. glutinosa* (*minima* nowhere meets *integrifolia*), and it is, again, on a little rocky ridge that *hirsuta* and *minima* are best able to come into contact, and there, if

anywhere, may be hope of finding their crosses. All these, in the garden are not only of the most gratifying heartiness, but are also—and especially *P. Kellereri*—of an even greater generosity in the way of flower than they are on their own native hills.

The last *minima* cross is one of enormous variety and complexity. *Primula glutinosa*, the fragrant violet glory of all the eastern granites, begins to the far west of *minima*, just on the easternmost fringe of Switzerland, in the Alps of the Bernina. And thence, invariably on igneous rock alone, it ranges in magnificent profusion over the highest moors of all the Alpine chains away towards Klagenfurt in the east, and as far south as the volcanic outbreaks beside the Pala Dolomites. On the Brenner begins *P. minima*; here the two meet, and thence-forward occupy together all the districts ranged by *P. glutinosa*. The result is a series of fertile hybrids (*minima* × *glutinosa*, and *glutinosa* × *minima*) that absolutely baffles nomenclature, the forms fluctuating endlessly between either parent, and re-breeding, and interbreeding, and cross-breeding until only the minutest botanical differences separate them at the end from their parents or each other. Four great classical names are however given : *P.* × *Huteri*, *P.* × *biflora*, *P.* × *Floerkeana*, *P.* × *salisburgensis*. These are very useful words, but quite without weight unless taken rightly as rough-and-ready means to express an inexpressible formula. The most important is the best form of a group that one may memorize as *P.* × *Floerkeana*, a splendid plant (*glutinosa* = *minima*, precisely intermediate, as I should say); with *glutinosa's* growth, *minima's* dense clustered habit, *glutinosa's* 3-inch scape, and three or four *minima*-sized flowers of a flaring vinous rose that is visible from a quarter of a mile away, amid the rolling blue films across the moorland of *P. glutinosa*, and the shimmering pink satin sheets of *P. minima*. *P.* × *Huteri* is rare, *glutinosa* < *minima* (or *minima* < *glutinosa*?) dwarf, two-blossomed and purple. Then comes *P.* × *biflora*, simply an enormous, twy-flowered *minima* (*minima* > *glutinosa*) an infrequent but a splendid development; then, last of the four stereotyped crosses and best known in cultivation, the large name of *P.* × *salisburgensis*. This is *glutinosa* > *minima* beyond a doubt; and usually very distinct—a dwarfer *glutinosa*, triflorous as a rule, with blossoms of a much redder violet than its mother, and narrower in outline than those of its pollen-parent. *P. salisburgensis* is in habit intermediate, compromising, with a laxly ramifying colony, between the single-clump growth of *glutinosa* and the spreading dense carpet of *minima*. Another thing that appears in my experience is the specially paludose proclivity of *P.* × *salisburgensis*. It is not that I have only seen it in the time of melting snow, for my first acquaintance with it was made in early August; but, while *P. glutinosa* is not by any means a *wet* ground plant, and *P. minima* is very definitely a dry-ground one (on the Alps), *P.* × *salisburgensis* I have always found, myself, growing in or close to little runnels of water, or in shallow pans of soil with continual percolation of water. The other three named forms seem happy under the ordinary conditions of their

parents; and all, in cultivation, are as easy as *minima* (if not easier) and far more easy than *glutinosa*, although they seem to me to inherit some of *glutinosa's* shyness in the matter of flowering. (I have a lovely pure blue '*salisburgensis*' which is almost *minima*, but, like *glutinosa*, is exceedingly reluctant to bloom.) And another thing that has struck me about this range of hybrids is the paradoxical distribution of their forms. So far as my quests have carried me you very often find one or other prevalent cross, without any of the rest—a problem I have vainly tried to solve by conjectures as to variations in fertilization that might be made by comparative differences in times of flowering here and there. Yet *minima* blooms in a blaze of splendour from earliest June and the melting of the snow, until far on in July to early August (on high cold banks), while *glutinosa* not only begins with *minima* as the snow melts, but outruns it by lasting until the snows are getting ready to descend again. Very likely my observations may be due, of course, merely to my imperfect experience. Be this as it may, I can only declare that on the Pasterze moor, where both parents abound, I have so far met no crosses at all; on Kraxenträger, above the Brenner, I found *P.* × *salisburgensis* sparsely occurring, but no trace of any other form: in the volcanic Monzoni-Thal, *Huteri* is rare, and *biflora* less so, while *Floerkeana* blots the blue distances with frequent slabs of hot amethyst, but there is no sign whatever of *P.* × *salisburgensis*; while on the granites south of the Rolle Pass I found *salisburgensis* abundant (in mid-June), but neither flower nor promise of any other. Whether aspect or geologic formation has any say in this matter I leave it to ampler knowledge to decide, and ampler experience may well declare that these fancied inequalities of distribution are so many vain imaginations drawn from the imperfection of my researches.

The next great parent to which we come is the true *P. viscosa* All. (1785) (in gardens too often masked by its varietal or subsequent specific names of *latifolia*, Lapeyr. (1813), *cynoglossifolia* and *graveolens*). This magnificent species, tall, many-flowered, red-purple, malodorous, ranges from the Pyrenees throughout the Graian, Cottian, and Maritime Alps and the Engadine, reaching its furthest easterly limit in the Voraarlberg, and more scantily penetrating south into the Bergamask Hills; and invariably, so far as I know, faithful to the igneous formations. Its associations are with *P. integrifolia*, sharing with this the Pyrenees, the Engadine, the Voraarlberg; with its subsection brother *P. marginata*, in the Maritime, Graian, and Cottian Alps (where it also meets with *P. cottia*), with *P. pedemontana* in the Western Graians (Mont Cenis), and with *P. hirsuta* right across the entire range of its distribution along the Central Alps, from the Pyrenees to the Voraarlberg. Among the crosses that result are some of the most brilliant things we have; the Engadine (that centre of *Auricula* × *hirsuta* = *P. pubescens*), where *hirsuta*, *viscosa*, and *integrifolia* all abound, is a specially happy hunting-place. For *P. integrifolia* × *viscosa* is there of quite frequent occurrence, ranging between the two types called in

gardens (whether rightly or wrongly) *P.* × *Dinyana* and *P.* × *Muretiana* —*Dinyana* being the pre-valent name, unless possibly *Muretiana* be allowed to stand for the reverse cross. These are very handsome plants, having something of *viscosa's* stature, many-flowered umbels, and imperial colouring, with *integrifolia's* great wide flowers to correct *viscosa's* rather narrow trumpets, even as *viscosa's* violet corrects the much feebler lilac of *P. integrifolia*. Of these, *in situ*, I can say nothing from personal experience, having only once visited the Engadine in early autumn, on which occasion, in the moss-cushion of a waterfall I collected a Primula (out of flower) which it was absurd to think could have sprung from drought-loving *viscosa*. *Viscosa* × *hirsuta* again (*P.* × *Berninae*, Kerner) is a brilliant and robust cross which I have not collected, but which is not uncommon where the parents abound, as in the Engadine, and down into the Bergamask Alps. *Viscosa* × *oenensis* (*P.* × *Kolbiana*, Widmer) belongs also to these southerly parts, but rests on a unique specimen imperfectly described and therefore best ignored. There is no chance, I think, of *viscosa* × *apennina*, or *viscosa* × *villosa*, as the species do not meet; *viscosa* × *cottia*, however, should certainly occur, though I have not yet discovered it.

Crosses in the same sub-section are, as I have said, so rare as to be either negligible or deserving of the most rigid and suspicious scrutiny (*e.g. glaucescens* × *spectabilis*, *hirsuta* × *oenensis*). Therefore I dare not commit myself as yet to anything even approaching a conjecture about a certain wide-flowered, blue-purple Primula, with definitely dentate foliage (the *cynoglossifolia* form of *viscosa* here prevailing, has usually entire leaves), which I found occurring with colonies of *P. viscosa*, by stream beds on the Mont Cenis, which certainly, if one could be more sure, or study it at home (but collected fragments of its woody trunks have not yet thriven with me), suggests, as far as its colouring and outline go, the influence of *P. marginata*. However, in all but those two points the plant was typically *P. viscosa*. The Mont Cenis, however, affords me my one original (as I believe) contribution up to date to the roll-call of Natural Primula Crosses, for *P. viscosa* shares the lesser Mont Cenis with *P. pedemontana*, and here, accordingly, even as *viscosa* interbreeds with *hirsuta* in the Engadine, so here it has interbred also with *hirsuta's* subsection brother. The result is a Primula which I dignify by the name of the Scientific Committee's Chairman, Mr. E. A. Bowles, who assisted, with cries of joy, at its discovery. **Primula* × *Bowlesii* is a counterpart, as might be imagined, of *P.* × *Berninae* (*viscosa* × *hirsuta*). It is nearer to *viscosa*, which is obviously its seed-parent, but has inherited from *P. pedemontana* a scantier coating of russet fur round the edge of its leaves, and an ampler form for the flowers, which are of a much warmer colouring than in *P. viscosa*, though *viscosa*, as well as its stature and design of umbel, has contributed a blurred purplish throat which mars the clear white eye that it should inherit from *pedemontana*.

* See p. 227.

Over all the moor and the boulders *P. pedemontana* sheds a glow of rose-pink tufts in masses of unbroken beauty ; here and there among *Loiseleuria* and *Vaccinium*, on the little humped hillocks, spring up the nodding red-purple umbels of *P. viscosa*, in its lesser *cynoglossifolia* form. And there, among them, very sparse and rare, it will not be long before the obvious new beauty of *P.* × *Bowlesii* challenges your eye, and declares itself irresistibly, from the first glance, as an intermediate between the two. Of *P.* × *Bowlesii* in culture I can hardly speak as yet ; my cherished specimens live, indeed, and prosper, but have not yet advanced so far as to flower. And I am beginning to wonder whether I have not perhaps under-rated the anti-calcareous fanaticism of *P. viscosa*; such slow, partial, and impermanent successes does my garden seem to show me (when I am inclined to despondency) from all the crosses that derive from it.

And now, to end these notes with one or two important hybrids of whose natural habit I cannot yet speak from experience. *P. integrifolia* is a lawn-forming species of the high moors, that ranges from the Pyrenees through Switzerland to the Voraarlberg. At first sight it seems a poor relation (though lovely enough in itself) to the gorgeous Arthritic Primulas, but is very easily known by its glandular, pilose leaves, and forms a sub-section to itself, shared only by the Croatian and Illyrian *P. Kitaibeliana*. I have already dealt with it, as collaborating with *P. viscosa* to produce *P.* × *Muretiana* and *P.* × *Dinyana*. In the Engadine, Voraarlberg, and Pyrenees, however, it also shares the hills with *P. hirsuta*, and the resulting *P.* × *Heerii*, Brügger, is one of the most brilliant plants in the race. It varies, however, indefinitely, and my enthusiasm must be understood only of the best, large-flowered, glowing, pink forms, and not by any means of the pale and washy developments that are sometimes seen. Yet another reputed cross of *hirsuta* needs little comment. In the Val d'Ambra of the Valtelline, in the territory of *P. glaucescens*, one lonely specimen was discovered (and that only in fruit) of a narrow-bracted, long-calyxed *hirsuta*, which was accordingly declared to be a hybrid between the two species—the suggestion being negligible and doubtful to the last point. And the last cross that I must deal with has also an Arthritic for its parent. But *P. Wulfeniana* cannot really compare, I think, with the dominating magnificence of *Clusiana* and *spectabilis* (which would dim the best) ; and I have little zeal for *P.* × *Venzoi*, Huter (*Venzoides*, Huter ex Kerner) which results when *Wulfeniana* in the last stretch of its westerly distribution just manages to infringe upon the ground of *P. tyrolensis* in the Cadorine Alps of the Southern Dolomites. I have a feeling that this plant may be the *P.* × *Muretiana* of gardens and catalogues, a useful, not uncommon, nor very interesting clump-forming small Primula, in which I see not a trace of either *viscosa* or *integrifolia*, such as the pedigree suggested (if correct) would involve The plant of gardens, however, is very willing, if not indestructible in growth, which accounts for its frequent occurrence alike in cultivation and in catalogues. *P. tyrolensis* × *Wulfeniana* should have little

glossy, glaucescent, stiffish, oval leaves, almost entire, or toothed, a little scape, a purplish calyx (a frequent inheritance from *Wulfeniana*, to which the whole form more nearly approaches), and two or three large lilac-rosy flowers.

And, finally, I would urge that much more attention be paid by gardeners, cultivators, and catalogues to these Natural Crosses of Primula, which, as a whole, are quite as brilliant a race as their parents, but at present languish too deep in undeserved obscurity, hidden from us in lists by false, doubtful, or conflicting names. Indeed, there are certain hybrids, such as *Kellereri*, *Forsteri*, *pubescens*, *Heeri*, and the magnificent *intermedia*, that I should be inclined to rank for show, ease of culture, and general garden value far above any of the species, except *spectabilis*, *Clusiana*, *marginata*, *carniolica*, *pedemontana*, *hirsuta*, and *Auricula*, greatly exceeding several even of these, as they do, in heartiness of habit, freedom of flower, and general amenability to any reasonably careful conditions of culture. And it will yet be possible for us to add still more to our treasures, by working farther for ourselves along the lines of nature, with as much skill and success, I hope, as that which has already produced us *Primula* × 'Marven.'

Table of European Primula Crosses.

Subsection Eu-Auricula × **Subsection Brevibracteatae** (*P. marginata*, *P. viscosa*, *P. carniolica*).

P. Auricula × *P. carniolica* = *P.* × *venusta*.
(*P.* × *venusta* × *P. marginata* = *P.* × 'Marven,' garden cross.)

Subsection Eu-Auricula × **Subsection Rhopsidion** (*P. Kitaibeliana*, *P. integrifolia*, *P. Allioni*, *P. tyrolensis*).

P. Auricula × *P. tyrolensis* = *P.* × *obovata*, Huter (extremely doubtful).

P. Auricula × *P. integrifolia* = *P.* × *Escheri*, Brügger.

Subsection Eu-Auricula × **Subsection Erythrodosum** (*P. villosa*, *P. hirsuta*, *P. oenensis*, *P. apennina*, *P. pedemontana*, *P. cottia*).

P. Auricula × *P. oenensis* = *P.* × *discolor*, Leybold (*Portae*, Huter).

P. Auricula × *P. pedemontana* = *P.* × *Sendtneri*, Kellerer (obscure garden cross).

P. Auricula × *P. hirsuta* = *P.* × *pubescens*, Jacq. (*P.* × *helvetica*, Don; × *rhaetica*, Gaud.; × *alba*, Hoffmsg.; × *alpina*, Schleicher; × *intermedia*, Van Houtte; × *Göblii*, Kerner; × *Arctotis*, Kerner; × *Kerneri*, Göbl and Stein; × *Peyritschii*, Stein). Infinitely variable and fertile.

P. Auricula × *P. villosa*
P. Auricula × *P. viscosa* } = Included by WIDMER, and by PAX, on his example, under × *P. pubescens*; an error and weakness, *me judice*; as, even if the interbred forms be complicated or undecipherable, there ought to be at least a *nomen nudum* to each of these great and originally distinct crosses.

Subsection Eu-Auricula × Subsection Arthritica (*P. glaucescens, P. spectabilis, P. Clusiana, P. Wulfeniana*).

P. Auricula Balbisii × *P. spectabilis* = a very problematical record from Mte. Baldo.

Subsection Chamaecallis × Subsection Arthritica.

P. minima × *P. spectabilis* (*P. fratensis, Fumana, Valbonae*, Gusmus. = *P.* × *Dumoulini*, Stein (*minima* > *spectabilis*).
P. × *Facchinii*, Pax (*minima* < *spectabilis*).

P. minima × *Wulfeniana* (*P. Deschmanni, Kankeriana, mutata*, Gusmus.) = *P.* × *serratifolia*, Widmer (*minima* > *Wulfeniana*).
P. × *vochinensis*, Widmer (*minima* < *Wulfeniana*).

P. minima × *Clusiana* = *P.* × *intermedia* (*Clusiana* × *minima* or *minima* < *Clusiana*).
P. × *caesarea*, Farrer, (*minima* > *Clusiana*).

Subsection Chamaecallis × Subsection Rhopsidion.

P. minima × *P. tyrolensis* = *P.* × *Juribella*, Sünd. (*minima* > *tyrolensis*).

Subsection Chamaecallis × Subsection Erythrodosum.

P. minima × *P. villosa* (*P. flatnitzensis, Laxii, variiformis*, Gusmus.) = *P.* × *Sturii*, Widmer (*minima* < *villosa*).
P. × *truncata*, Widmer (*minima* > *villosa*).

P. minima × *P. oenensis* = *P.* × *coronata*, Porta
P. × *pumila*, Kerner (*minima* > *oenensis*).
P. × *Widmerae*, Pax (*minima* < *oenensis*).

P. minima × *P. hirsuta* = *P.* × *Steinii*, Widmer
P. × *Forsteri*, Widmer (*minima* > *hirsuta*).
P. × *Steinii*, Obrist. (*minima* = *hirsuta*).
P. × *Kellereri*, Widmer (*minima* < *hirsuta*).

Subsection Chamaecallis × Subsection Cyanopsis (*P. deorum, P. glutinosa*).

P. minima × *P. glutinosa* =
- *P.* × *Huteri*, Pax (*minima* > *glutinosa*).
- *P.* × *Floerkeana*, Pax (*minima* = *glutinosa*).
- (*P. glutinosa* × *P. minima* also.)
- *P.* × *biflora*, Pax (*minima* > *glutinosa*).
- *P.* × *salisburgensis*, Pax (*minima* ≪ *glutinosa*).
- (*P. glutinosa* × *P. minima* also.)
- (A very complicated, fertile, interbreeding range.)

Subsection Cyanopsis × Subsection Rhopsidion.

P. glutinosa × *P. integrifolia* = *P.* × *Hugueninii*, Brügger (insufficiently observed, and awaiting confirmation).

Subsection Brevibracteatae × Subsection Rhopsidion.

P. viscosa × *P. integrifolia* (and the reverse). = *P.* × *Dinyana*, Lagger (× *Muretiana*, × *Mureti*, Moritzi) (intermediate, variable, and sterile).

Subsection Brevibracteatae × Subsection Erythrodosum.

P. viscosa × *P. hirsuta* (and the reverse) = *P.* × *Berninae*, Kerner (*Salisii*, Brügger), of indefinite variation, and fertile with its parents.

P. viscosa × *P. oenensis* = *P.* × *Kolbiana*, Widmer (a unique, incomplete, and unconfirmed record, if not in itself improbable).

P. viscosa × *P. pedemontana* = *P.* × *Bowlesii*, Farrer (*viscosa* = *pedemontana*).

Subsection Arthritica × Subsection Erythrodosum.

P. glaucescens × *P. hirsuta*, a very doubtful cross, and probably mythical.

Subsection Rhopsidion × Subsection Arthritica.

P. tyrolensis × *P. Wulfeniana* = *P.* × *Venzoi*, Huter (*venzoides*, Huter; *cridalensis, micrantha, adulterina, valmenona*, Gusmus) (*tyrolensis* < *Wulfeniana*).

Subsection Erythrodosum × Subsection Rhopsidion.

P. hirsuta × *P. integrifolia* = *P.* × *Heeri*, Brügger (intermediate and sterile.
(*P. davosiana, Laggeri, assimilis montavoniensis, Trisannae*, &c.)

Inter-subsectional crosses, Erythrodosum × Erythrodosum.

P. hirsuta × *P. oenensis* = *P.* × *Seriana*, Widmer.

Arthritica × Arthritica.

P. glaucescens var. *longobarda* × *P. spectabilis* = *P.* × *Carueli*, Porta.

Discussion.

In answer to the Chairman, the Lecturer said: I think, with regard to *Primula viscosa*, *latifolia* is a later name. The proper specific name of the species is *viscosa*, and it is in three main marked varieties. The first is the form which occurs in the Pyrenees; the second is *Primula cynoglossifolia*, which has a habit of growing in more open spaces, and the third is the *P. latifolia* found usually among rocks, and very often on the shady and northerly side of the rocks. It has something of the habit of the *marginata*.

The President: They seem to have abandoned the name—I am speaking of two or three years ago—of *latifolia* in favour of *Berninae*.

The Lecturer: The name *Berninae* only applies to the hybrid with *P. hirsuta*.

Afternoon Session.

After the luncheon interval the Chairman called upon Professor J. Bayley Balfour, F.R.S., V.M.H., for his paper on 'Chinese Primulas.' [*Note.*—Prof. Balfour illustrated his remarks by a splendid series of photographs, many of which are, with his kind permission, reproduced here.] The following is a synopsis of his lecture :—

"CHINESE SPECIES OF PRIMULA."

Prof. Bayley Balfour,—To write of the Primulas of China is my task. In relation to its scope the following statistics are of interest :—

At the time of Linnaeus the number of species known which he had to include in his *Species Plantarum*, published in 1753, was 6. Of the 6 one only is extra-European—*Primula cortusoides*, Linn., a West Siberian plant.

Lehmann, in his *Monograph of Primula*, dated 1817, describes 44 species. Of these nearly one-half are not recognized nowadays as species, some of them being hybrids and others merely growth-forms or variations. Eight of his species are extra-European, and of these none is Indian and none is Chinese.

When Duby wrote the *Monograph of Primulaceae* in De Candolle's *Prodromus*, published in 1844, the work of Wallich and Royle had made known something of the flora of the Himalayas, and of the

FIG. 41.—PRIMULA SINENSIS. WILD FORM. $\frac{2}{3}$ size.

[*To face p.* 128.

FIG. 42.—PRIMULA LICHIANGENSIS, G. Forrest. $\frac{2}{3}$ size

61 species admitted by DUBY 17 are Indian, but there is only one Chinese—*P. sinensis*, Lindl.

The next comprehensive treatment of *Primula* was that by PAX in 1888. In his preliminary review of the genus published in that year 144 are admitted, and of them Indian species number 46, Chinese 37.

It was not until 1905 that PAX published his complete Monograph in Engler's "Pflanzenreich," and in the interval the known species had increased to 208, of which 54 are Indian and 88 Chinese.

Not a decade has elapsed since the date of PAX's Monograph,* and during it the accessions to our knowledge of species have been so numerous that we have to reckon with nearly 300 which are distributed somewhat after this fashion:—some 70 are Himalayan; over 140 are Chinese; about 40 occur in Asia outside the Himalayas and China; 14 are Japanese; 19 are American.

In the present state of knowledge the species of *Primula* known from China equal in number, or even outnumber, all other known species.

These figures are to be taken as indicating general relationship only. They are not precise data. So much depends upon the estimate of what is species and what is variety that no two botanists would, I fancy, bring out the same figures. Nor are they to be interpreted as either an approach to the total number of species that are to come to our ken or as suggesting a final numerical ratio between the species in the several areas. True it is that the Primula treasury of Europe is pretty well exhausted of its species. Also the Japanese have so thoroughly worked out their flora that few more species are likely to be forthcoming from Japan. What we know, too, of the development of the genus in America does not promise any great addition to the number of species from that continent. But the mountain ranges of Asia from the Caucasus eastwards, and particularly in the southern boundary ending in China of the great Asiatic Divide, have assuredly hordes of Primulas awaiting discovery, and we may say with confidence that the coming decade will see the number of known species increased by one half, if not doubled. When the time comes for critical study leading to the determination of microforms, the numerical increment of recognized forms must reach a figure which it would be rash to forecast.

The accessions in recent years to our knowledge of the Primulas of China have been primarily the result of the work of the missionaries of the French Catholic Mission. DAVID in Muping, DELAVAY at Talifu, DUCLOUX and MAIRE at Yunnanfu, FABER at Mt. Omi, FAURIE and SOULIÉ at Tatsienlu and Batang, FARGES at Chengkow, GIRALDI in North Shensi, MONBEIG at Tseku, by their strenuous collecting through the years since the sixties of last century, have enriched European Herbaria, principally the Herbarium of the Jardin des Plantes in Paris, with material which has given botanists a new

See p. 219.

outlook on the Primula world. But the work of these residents, if I may so call them, has been singularly without direct effect upon Horticulture. I mean that the Herbarium, not the Garden, has benefited chiefly. Indeed, so far as I know, *P. Forbesii*, Franch., and *P. Poissonii*, Franch., are the only species of *Primula* of our gardens that have come to us through them directly.

Of our countrymen, PRATT, working in the north about Tatsienlu, and especially HENRY, in the south at Ichang and Mengtsz, have likewise furnished our Herbaria with many new species of *Primula*—none to our gardens. It is to the enterprise of Messrs. VEITCH of Chelsea that Horticulture is indebted—as it has been in so many fields—for the first sight of the wonders of the new Primula world of China opened up by collections for the Herbarium, and the name of E. H. WILSON, their collector, will always be honoured by Horticulturists. WILSON's exploration from Ichang on the south to beyond Tatsienlu on the north brought to our knowledge plants from areas outside the range of workers from the mission centres; and now his good work is being continued by PURDOM under the same firm, the result of which we see in the lovely *P. Purdomi* which Messrs. VEITCH have just shown to us.

Following the example of Messrs. VEITCH, Mr. BULLEY (now BEES, Ltd.) sent out GEORGE FORREST to Yunnan, and he, journeying in the track of the missionaries from Tali up the Mekong-Salween and Mekong-Yangtze Divides, tapped for horticultural purposes the best known Primula area. FORREST is again in Yunnan as collector for J. C. WILLIAMS, Esq., of Caerhays Castle. His most recent find in the way of Primulas—*P. helodoxa*, Balf. fil., a splendid orange-yellow Candelabra—will, I hope, be in our gardens in course of this year. To Yunnan also KINGDON WARD has just returned to renew the exploration for BEES, Ltd. which two years ago he carried out on the Mekong-Salween Divide.

From these explorers—WILSON and PURDOM for Messrs. VEITCH, FORREST and KINGDON WARD for BEES, Ltd., and FORREST for Mr. WILLIAMS—the Chinese Primulas recently introduced have come, and from those of them who are now again exploring we hope for further accessions. As yet we have only reaped sporadically in the plenteous field of China's Primulas.

Everyone interested in Primulas is grateful to Professor PAX for his pioneer work in modern times upon the genus. His book is indispensable. His treatment of the AURICULA section is masterly, and I say the like of his dealing with the VERNALES. In these sections, which include the Primulas of Europe and the European Alps, the types have been so long known and so much studied both in herbaria and in their habitats, and so little remains to be added outside the domains of microspecies and hybrids, that material for a fairly correct judgment is available. It is otherwise with the Eastern Asiatic species, and I gather from his Monograph that Professor PAX had not the advantage of studying critically the plants in the Paris Herbarium. As a consequence identifications are sometimes faulty and his grouping of the

Eastern species is not always natural—and this indeed PAX confesses. In writing here of the Chinese species I use PAX's work as a basis—as everyone must do—but make several departures from his sectional groupings, and in some cases differ from him in the matter of identification and synonymy. If I do so it is without suggestion of finality in the conclusions at which I have arrived. These are based upon a little more knowledge of Chinese plants than was possessed by Professor PAX, for it has been my privilege to see not only the types of most of FRANCHET'S and HEMSLEY'S species included in PAX'S Monograph, but also the types of species described subsequent to its appearance by PETITMENGIN, BONATI, and R. KNUTH. And here I wish to express my obligation to the Director of Kew, the Director of the Botanical Department of the Jardin des Plantes, Paris, the Director of the Imperial Botanic Garden, Berlin, the Director of the Imperial Botanic Garden, St. Petersburg, and to M. BONATI for the loan or gift of many specimens which have enabled me to acquire a better knowledge of the Chinese species. Apart from the fact that we know only a quota of the Chinese species and fewer of the Himalayan which have phyletic bonds with the Chinese, the obstacles that make difficult the establishing of the true relationships of the forms are want of fruit and seed and of description of habitat, and then the heteromorphy of the flowers fosters misleading description. I am sufficiently modest to invite criticism and correction of what follows, and at the same time I discount inconsistency when further knowledge, as it must, compels modification of it.

In the following list I give the names of all the species of Chinese Primula, with their synonymy, that are known to me. If I have retained some names as of the rank of species and have not placed them as synonyms in accordance with comments I make in subsequent pages of this paper, I have been influenced by the feeling that for Horticultural purposes a definite name for a plant form under the rank of species is convenient; and further, the material which I have had for examination has sufficed often only to suggest without giving adequate data for a decision.

CHINESE SPECIES OF PRIMULA, WITH SYNONYMY.

P. albiflos, F. K. Ward. (Sect. NIVALIS.) Mekong-Salween Divide.

P. ambita, Balf. fil. = **obconica** microform.

P. amethystina, Franch. (Sect. AMETHYSTINA.) Yunnan: Tali region.

P. androsacea, Pax = **Forbesii** microform.

P. angustidens, (Franch.) Pax = **Wilsoni.**

P. argutidens, Franch. (Sect. SOLDANELLOIDES.) Central Szechwan: Tatsienlu.

P. Barbeyana, Petitm. = **Forbesii** microform.

P. barbicalyx, Wright = **obconica** microform.

P. bathangensis, Petitm. (Sect. MALVACEA.) W. Szechwan: Batang.

P. Beesiana, G. Forrest. (Sect. CANDELABRA.) Yunnan : Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. begoniaeformis, Petitm. = **obconica** microform.

P. bella, Franch. (Sect. BELLA.) Yunnan : Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

Microform :—

P. Bonatiana, Petitm. Yunnan : Mt. Sila, Upper Mekong.

P. Biondiana, Petitm. (Sect. AURICULATA.) Central Szechwan : Tatsienlu.

P. biserrata, G. Forrest = **serratifolia,** Franch.

P. blattariformis, Franch. (Sect. MALVACEA.) Yunnan : Tali region.

P. Bonatiana, Petitm. = **bella** microform.

P. Bonatii, R. Knuth = **obconica** microform.

P. BOREALIS, Duby (Sect. FARINOSA), in its

Microform :—

P. Loczii, Kanitz. Kansu.

P. bracteata, Franch. (Sect. SUFFRUTICOSA.) Yunnan : Tali region.

P. breviscapa, Franch. (Sect. DAVIDI.) S. Szechwan.

P. brevifolia, G. Forrest. (Sect. AMETHYSTINA.) Mekong-Salween Divide.

P. bullata, Franch. (Sect. SUFFRUTICOSA.) Yunnan : Tali region.

P. Bulleyana, G. Forrest. (Sect. CANDELABRA.) Yunnan : Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. calliantha, Franch. (Sect. NIVALIS.) Yunnan : Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. capitata, G. Forrest = **sphaerocephala.**

P. Cavalieri, Petitm. = **obconica** microform.

P. cernua, Franch. (Sect. MUSCARIOIDES.) Yunnan : Tali region.

P. chartacea, Franch. (Sect. CHARTACEA.) Yunnan.

P. cinerascens, Franch. (Sect. MOLLIS.) Shensi : Tsinling Mts.

P. Clementinae, G. Forrest = **kichanensis.**

P. Cockburniana, Hemsl. (Sect. CANDELABRA.) Central Szechwan : Tatsienlu. Cult. Introd. 1906, Veitch. Coll. Wilson.

P. coerulea, G. Forrest. (Sect. DAVIDI.) Yunnan : Tali region. Cult. Introd. 1911, Bees, Ltd. Coll. Forrest.

P. cognata, Duthie. (Sect. AURICULATA.) Kansu. Cult. Introd. 1906, Veitch. Coll. Wilson.

P. congestifolia, G. Forrest = **dryadifolia.**

P. cortusoides, Linn., var. *lichiangensis,* G. Forrest = **lichiangensis.**

P. cyclaminifolia Franch., ex Petitm. = **Partschiana.**

P. Davidi, Franch. (Sect. DAVIDI.) Central Szechwan : Muping.

P. debilis, Bonati = **pellucida.**

P. deflexa, Duthie. (Sect. MUSCARIOIDES.) West China. Cult. Introd. 1906, Veitch. Coll. Wilson.

P. Delavayi, Franch. (Sect. OMPHALOGRAMMA.) Yunnan : Tali region. Cult. Introd. 1911, Bees, Ltd. Coll. Forrest.

Omphalogramma Delavayi, Franch.

P. delicata, G. Forrest = **spicata.**

P. delicata, Petitm. = **Forbesii** microform.

P. delicatula, Dunn = **spicata.**

P. denticulata, G. Forrest. Includes undescribed forms of the DENTICULATA section.

P. denticulata, Smith. (Sect. DENTICULATA.) S.-E. Yunnan: Mengtsz. Cult. Introd. 1842, Veitch.

P. pulcherrima, Hort.

P. diantha, Bur. et Franch. (Sect. MINUTISSIMA.) W. Szechwan: Batang to Litang.

P. Dielsii, Petitm. = **tongolensis.**

P. dryadifolia, Franch. (Sect. DRYADIFOLIA.) Yunnan: Tali region. Cult. Introd. 1911, Bees, Ltd. Coll. Forrest.

P. congestifolia, G. Forrest.

P Dubernardiana, G. Forrest. (Sect. SUFFRUTICOSA.) Yunnan: Tseku.

P. Duclouxii, Petitm. = **Forbesii** microform.

P. efarinosa, Pax. (Sect. DENTICULATA.) W. Hupeh.

P. Engleri, R. Knuth. (Sect. OMPHALOGRAMMA.) Central Szechwan: Tatsienlu.

P. Esquirolii, Petitm. (Sect. DAVIDI.) Prov. Kweichow.

P. Faberi, Oliv. (Sect. SOLDANELLOIDES.) Central Szechwan: Mt. Omi.

P. Lecomtei, Petitm.

P. Fargesii, Franch. (Sect. SOLDANELLOIDES.) Shensi: Tsinling Mts.

P. farinosa, G. Forrest. Includes—**P. polyphylla,** Franch. ex Petitm., **P. pseudodenticulata,** Pax, and other forms of the DENTICULATA section.

P. Filchnerae, R. Knuth et Diels. (Sect. FILCHNERAE.) Shensi: Tsinling Mts.

P. flava, Maxim. (Group SOULIEI.) Kansu.

P. Forbesii, Franch. (Sect. MALACOIDES.) Yunnan: Tali region, and elsewhere. Cult. Introd. 1891, Vilmorin.

Microforms:—

P. androsacea, Pax. S.-E. Yunnan: Mengtsz.

P. Barbeyana, Petitm. Central Szechwan: Tatsienlu.

P. delicata, Petitm. Yunnanensen.

P. Duclouxii, Petitm. Yunnanensen.

P. multicaulis, Petitm. Yunnan.

P. pellucida, Franch. Yunnan.

P. Willmottiae, Petitm. Yunnan: Tali region.

P. Forrestii, Balf. fil. (Sect. SUFFRUTICOSA.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. Fortunei, Vatke.

P. Franchetii, Pax. (Sect. OMPHALOGRAMMA.) Yunnan: Tali region, Yakalo.

Omphalogramma Souliei, Franch.

P. Gagnepainii, Petitm. = **heucherifolia.**

P. gemmifera, Batalin. (Sect. MACROCARPA.) Kansu.

P. Giraldiana, Pax. (Sect. MUSCARIOIDES.) Yunnan: Tseku, Kari Pass. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.
P. muscarioides, Hemsl.

P. glacialis, Franch. (Group GLACIALIS.) Yunnan: Tali region.

P. glycosma, Petitm. (Sect. CANDELABRA.) Yunnan.

P. gracilenta, Dunn. (Sect. MUSCARIOIDES.) N.W. Szechwan.

P. gratissima, G. Forrest = **sonchifolia.**

P. helodoxa, Balf. fil. (Sect. CANDELABRA.) Yunnan: Tengyueh. Cult. Introd. 1913, Mr. Williams. Coll. Forrest.

P. Hemsleyi, Petitm. (Sect. MACROCARPA.) Central Szechwan: Tatsienlu.

P. Henrici, Bur. et Franch. (Sect. SUFFRUTICOSA.) E. Tibet: Lhasa to Batang.

P. Henryi, (Hemsl.) Pax. (Sect. CAROLINELLA.) S.-E. Yunnan: Mengtsz. *Carolinella Henryi,* Hemsl.

P. heucherifolia, Franch. (Sect. GERANIOIDES.) Yunnan: Tali region. Cult. Introd. Miss Willmott. Coll. Wilson.
P. Gagnepainii, Petitm.

P. incisa, Franch. (Sect. SOLDANELLOIDES.) Central Szechwan: Muping, Tatsienlu.

P. kialensis, Franch. (Sect. YUNNANENSIS.) Central Szechwan Tatsienlu.

P. kichanensis, Franch. ex Petitm. (Sect. YUNNANENSIS.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.
P. Clementinae, G. Forrest.

P. Knuthiana, Pax. (Group SERTULUM.) N. Shensi. Cult.

P. langkongensis, G. Forrest = **malvacea.**

P. Lecomtei, Petitm. = **Faberi.**

P. leptopoda, Bur. et Franch. = **stenocalyx.**

P. lichiangensis, G. Forrest. (Sect. CORTUSOIDES.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.
P. cortusoides, Linn., var. *lichiangensis,* G. Forrest.

P. Listeri, G. Forrest = **sinolisteri.**

P. Littoniana, G. Forrest. (Sect. MUSCARIOIDES.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. Loczii, Kanitz = **borealis** microform.

P. longituba, G. Forrest = **membranifolia.**

P. malacoides, Franch. (Sect. MALACOIDES.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. malvacea, Franch. (Sect. MALVACEA.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.
P. langkongensis, G. Forrest.

P. mallophylla, Balf. fil. (Sect. CANDELABRA.) E. Szechwan.

P. Mandarina, Hoffmsg. = **sinensis.**

P. Maximowiczii, Regel. (Sect. MAXIMOWICZII.) Kansu eastwards. Cult. Introd. 1911, Veitch. Coll. Purdom.
P. oreocharis, Hance.

P. membranifolia, Franch. (Sect. YUNNANENSIS.) Yunnan: Tali region. Cult. Introd. 1908, Veitch. Coll. Forrest.
P. longituba, G. Forrest.

P. microdonta, Franch. ex Petitm. (Sect. SIKKIMENSIS.) W. Szechwan: Batang. Cult. Introd. 1912, Bees, Ltd. Coll. Kingdon Ward.

P. minutiflora, G. Forrest = **Androsace saxifragaefolia,** Bunge.

P. Monbeigii, Balf. fil. (Sect. SUFFRUTICOSA.) Yunnan: Tseku.

P. multicaulis, Petitm. = **Forbesii** microform.

P. mupinensis, Franch. (Sect. PETIOLARIS.) Central Szechwan: Muping.

P. muscarioides, Hemsl. = **Giraldiana.**

P. nessensis, G. Forrest. (Sect. DENTICULATA.) Yunnan. Cult. Introd. 1911, Bees, Ltd. Coll. Forrest.

P. neurocalyx, Franch. (Sect. MALVACEA.) Shensi: Tsinling Mts.

P. NIVALIS, Pallas (Sect. NIVALIS), in its
Microforms:—

P. sinoplantaginea, Balf. fil. Yunnan: Mekong-Yangtze Divide, Atuntzu.

P. sinopurpurea, Balf. fil. Yunnan: Tali region.

P. nutans, Franch. (Sect. MUSCARIOIDES.) Yunnan: Tali region.

P. nutantiflora, Hemsl. = **Fargesii.**

P. obconica, Hance. (Sect. OBCONICO-LISTERI.) W. Hupeh: Ichang. Cult. Introd. 1880, Veitch. Coll. Maries.
P. poculiformis, Hook. fil.
Microforms:—

P. ambita, Balf. fil. Yunnan.

P. barbicalyx, Wright. S. Yunnan: Szemao.

P. begoniaeformis, Petitm. Yunnan: Tali region.

P. Bonatii, R. Knuth. Yunnanfu region: Mile.

P. Cavalieri, Petitm. W. Szechwan.

P. oreodoxa, Franch. Central Szechwan: Muping.

P. parva, Balf. fil. Yunnansen: Kweichowfu.

P. Petitmengini, Bonati. Yunnan: Tali region, Pinchwan.

P. sinolisteri, Balf. fil. Yunnan: Tali region.

P. Vilmoriniana, Petitm. Yunnan.

P. obovata, (Hemsl.) Pax. (Sect. CAROLINELLA.) S.-E. Yunnan: Mengtsz.
Carolinella obovata, Hemsl.

P. oculata, Duthie. (Sect. GERANIOIDES.) Central Szechwan: Tatsienlu. Cult. Introd. 1904, Veitch. Coll Wilson.

P. odontocalyx, (Franch.) Pax. (Sect. PETIOLARIS.) Shensi: Tsinling Mts.
P. tenuissima, Pax.

P. operculata, R. Knuth = **Wilsoni.**

P. orbicularis, Hemsl. (Sect. SIKKIMENSIS.) Central Szechwan. Cult. Introd. 1906, Veitch. Coll. Wilson.

P. oreocharis, Hance = **Maximowiczii.**

P. oreodoxa, Franch. = **obconica** microform.

P. oreodoxa, Hort. = **saxatilis.**

P. ovalifolia, Franch. (Sect. DAVIDI.) Central Szechwan: Mengtsz. Cult. Introd. about 1906, Veitch. Coll. Wilson.

P. Partschiana, Pax. (Sect. CAROLINELLA.) S. Yunnan: Mengting Mts.

Carolinella cordifolia, Hemsl.

P. parva, Balf. fil. = **obconica** microform.

P. Paxiana, Gilg. (Sect. uncertain.) Shantung: Kiaochow.

P. pellucida, Franch. = **Forbesii** microform.

P. debilis, Bonati.

P. speluncicola, Petitm.

P. penduliflora, Franch. ex Petitm. (Sect. SOLDANELLOIDES.) Yunnan: Tali region.

P. Petitmengini, Bonati = **obconica** microform.

P. pinnatifida, Franch. (Sect. MUSCARIOIDES.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. pintchouanensis, Petitm. (Sect. MALVACEA.) Yunnan: Tali region, Pinchwan.

P. poculiformis, Hook. fil. = **obconica.**

P. Poissonii, Franch. (Sect. CANDELABRA.) Yunnan: Tali region. Cult. Introd. 1890, Jardin des Plantes, Paris.

P. polyneura, Franch. (Sect. CORTUSOIDES.) Central Szechwan: Tatsienlu.

P. polyphylla, Franch. ex Petitm. (Sect. DENTICULATA.) Yunnan: Tali region.

P. Prattii, Hemsl. (Sect. AURICULATA.) Szechwan.

P. praeniteus, Ker-Gawl. = **sinensis.**

P. pseudobracteata, Petitm. (Sect. SUFFRUTICOSA.) W. Szechwan: Batang.

P. pseudocapitata, F. K. Ward. (Sect. SPHAEROCEPHALA.) N.W. Yunnan: Atuntsu. Cult. Introd. 1911, Bees, Ltd. Coll. Kingdon Ward.

P. pseudodenticulata, Pax. (Sect. DENTICULATA.) S.-E. Yunnan: Mengtsz, also Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. pseudomalacoides, L. B. Stewart. (Sect. MALACOIDES.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. pseudosikkimensis, G. Forrest. (Sect. SIKKIMENSIS.) Yunnan: Tseku. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. pulchella, Franch. (Sect. NIVALIS.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. pulchelloides, F. K. Ward. (Sect. NIVALIS.) Yunnan. Cult. Introd. 1911, Bees, Ltd. Coll. Kingdon Ward.

P. pulverulenta, Duthie. (Sect. CANDELABRA.) W. Szechwan. Cult. Introd. 1905, Veitch. Coll. Wilson.

P. pumilio, Maxim. (Group SERTULUM.) Kansu,

P. Purdomi, Craib. (Sect. NIVALIS.) West Kansu. Cult. Introd. 1913, Veitch. Coll. Purdom.

P. pycnoloba, Bur. et Franch. (Sect. PYCNOLOBA.) Central Szechwan: Tatsienlu. Cult. Intro. 1906, Veitch. Coll. Wilson.

P. racemosa, Bonati. (Sect. MALVACEA.) W. Szechwan: Batang.

P. reflexa, Petitm. (Sect. SIKKIMENSIS.) W. Szechwan: Batang, Yaragong.

P. Rosthornii, Diels = **neurocalyx.**

P. rufa, Balf. fil. (Sect. SUFFRUTICOSA.) Yunnan: Tali region.

P. szechuanica, Pax. (Sect. MAXIMOWICZII.) Central Szechwan: Tatsienlu.

P. secundiflora, Franch. (Sect. SIKKIMENSIS.) Yunnan: Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. semperflorens, Loisel. = **sinensis.**

P. septemloba, Franch. (Sect. GERANIOIDES.) Yunnan: Tali region. Central Szechwan: Mt. Omi. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. serratifolia, G. Forrest = **Beesiana.**

P. serratifolia, Franch. non Pax. (Sect. CANDELABRA.) Yunnan: Tali region, Tseku. Cult. Introd. 1908, Bees, Ltd. Coll. G. Forrest.

P. biserrata, G. Forrest.

P. serratifolia, Pax. Chimaera of **P. Beesiana,** G. Forrest, **P. pulverulenta,** Duthie, and **P. serratifolia,** Franch.

P. sertulum, Franch. (Group SERTULUM.) E. Szechwan.

P. setulosa, Kickx = **sinensis.**

P. sibirica, Jacq. (Sect. FARINOSA.) Kansu. Cult.

P. sikkimensis, Hook. fil. (Sect. SIKKIMENSIS.) Yunnan: Tal region. Cult.

P. sikkimensis, G. Forrest = **pseudosikkimensis.**

P. silaensis, Petitm. (Sect. SOLDANELLOIDES.) Yunnan: Mt. Sila, Upper Mekong.

P. sinensis, Lindl. (Sect. AUGANTHUS.) W. Hupeh: Ichang. Cult. Introd. 1820.

Auganthus praenitens, Link.
Oscaria chinensis, Lilja.
Primula Mandarina, Hoffmsg.
,, *praenitens,* Ker-Gawl.
,, *semperflorens,* Loisel.
,, *setulosa,* Kickx.
Primulidium sinense, Spach.

P. sinuata, Franch. (Group TONGOLENSIS.) Yunnan: Tali region.

P. sinolisteri, Balf. fil. = **obconica** microform.

P. sinomollis, Balf. fil. (Sect. MOLLIS.) Yunnan: Tali region, Tengyueh. Cult. Introd. 1913, Williams. Coll. Forrest.

P. sinopurpurea, Balf. fil. = **nivalis** microform.

P. sinoplantaginea, Balf. fil. = **nivalis** microform.

P. sonchifolia, Franch. (Sect. SONCHIFOLIA.) Yunnan : Tali region.

P. gratissima, G. Forrest.

P. Souliei Franch. (Group SOULIEI.) Central Szechwan : Tatsienlu, Tungngolo.

P. speluncicola, Petitm. = **pellucida.**

P. sphaerocephala, Balf. fil. (Sect. SPHAEROCEPHALA.) Yunnan : Kari Pass.

P. spicata, Franch. (Sect. SOLDANELLOIDES.) Yunnan : Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. delicata, G. Forrest.

P. delicatula, Dunn.

P. stenocalyx, Maxim. (Sect. AURICULATA.) Kansu.

P. leptopoda, Bur. et Franch.

P. taliensis, G. Forrest. (Sect. PETIOLARIS.) Yunnan : Tali region.

P. tangutica, Duthie. (Sect. MAXIMOWICZII.) Kansu. Cult. Introd. 1906, Veitch. Coll. Wilson.

P. Maximowiczii var. *tangutica,* Regel.

P. taraxacoides, Balf. fil. (Sect. SONCHIFOLIA.) Yunnan.

P. tenuissima, Pax = **odontocalyx.**

P. tongolensis, Franch. (Group TONGOLENSIS.) Central Szechwan : Tatsienlu, Tungngolo.

P. Dielsii, Petitm.

P. tsetzouenensis, Petitm. (Sect. SIKKIMENSIS.) Yunnan : Tseku.

P. umbrella, G. Forrest. (Sect. YUNNANENSIS.) Yunnan : Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. urticifolia, Maxim. (Group SOULIEI.) W. Kansu.

P. Veitchiana, Petitm. (Sect. CHARTACEA.) W. China.

P. Veitchii, Duthie. (Sect. CORTUSOIDES.) W. Szechwan. Cult. Introd. 1906, Veitch. Coll. Wilson.

P. vernicosa, F. K. Ward. (Sect. PETIOLARIS.) Mekong-Salween Divide.

P. veronicoides, Petitm. = **Stimpsonia chamaedryoides,** Wright.

P. Viali, Franch. (Sect. MUSCARIOIDES.) Yunnan : Tali region.

P. Viali, Pax. Chimaera of **P. deflexa,** Duthie, **P. gracilenta,** Dunn, **P. Viali,** Franch., and **P. Watsoni,** Dunn.

P. Vilmoriniana, Petitm. = **obconica** microform.

P. vincaeflora, Franch. (Sect. OMPHALOGRAMMA.) Yunnan : Tali region. Cult. Introd. 1905, Bees, Ltd. Coll. Forrest.

P. violodora, Dunn. (Sect. MOLLIS.) W. Hupeh.

P. vittata, Bur. et Franch. (Sect. SIKKIMENSIS.) Yunnan : Tali region. Cult. Introd. 1905, Veitch. Coll. Wilson.

P. Watsoni, Dunn. (Sect. MUSCARIOIDES.) Central Szechwan : Tatsienlu. Cult. Introd. 1911, R.B.G.Edin. Coll. Watson.

P. Willmottiae, Petitm. = **Forbesii** microform.

P. Wilsoni, Dunn. (Sect. CANDELABRA.) Yunnan : Tali region. Cult. Introd. 1907, Veitch. Coll. Wilson.

P. angustidens, (Franch.) Pax.
P. japonica var. *angustidens*, Franch.

P. yargongensis, Petitm. (Group GLACIALIS.) W. Szechwan : Batang, Yaragong.

P. yunnanensis, Franch. (Sect. YUNNANENSIS.) Yunnan : Tali region. Cult. Introd. 1908, Bees, Ltd. Coll. Forrest.

P. zambalensis, Petitm. (Group GLACIALIS.) W. Szechwan : Batang.

In writing of the species in their several sections and groups I follow generally, for convenience of comparison, the sequence adopted by PAX. The first section he mentions is SINENSIS—a fitting one with which to begin an account of Chinese species. It is a large one, bringing together forms with revolute, petiolate, more or less hairy leaves having rounded often lobed blades, and large flowers, of which the calyx gives definite character for diagnosis. But SINENSIS is really an aggregate, and for our purpose in relation to Horticulture it is convenient to segregate the species in smaller groups which are phyletic sections. The sections are : AUGANTHUS, FILCHNERAE, CORTUSOIDES, OBCONICO-LISTERI, GERANIOIDES, PYCNOLOBA, MOLLIS, MALVACEA.

SECTION AUGANTHUS.

Primula sinensis, Lindl., is a unique plant in the genus—so much so that thrice in botanical history it has been made the type of a genus distinct from Primula under the respective names *Auganthus* (Link), *Oscaria* (Lilja), *Primulidium* (Spach). PAX placed it, but with reservations, in his section SINENSIS, expressing a preference for separating it in a section by itself, taking LINK's generic name for it. I have followed his preference. The inflated calyx is its dominant feature. The plant has been in cultivation since 1820, and of its history and the marvellous developments it has undergone alike in flower and foliage I do not require to write. Has this not all been told in the pages of the Society's JOURNAL by Mr. ARTHUR SUTTON,* whose firm has had so large a share in bringing about the evolution ?—and the progress that has been made since the date of his paper is on lines foreshadowed then. Nor shall I dwell upon its foliage as a favourite subject for demonstration of transmission of characters in consonance with Mendelian rules. I will only say that so long ago as 1876 REGEL raised the question—Has the fern-leaved form of the species known as *P. sinensis filicifolia* taken origin in nature or in cultivation ? So far as I know, the form has not been found in the wild state, and indeed in nature *P. sinensis*, Lindl., is wonderfully stable, and its area of spread in China is limited to the hills about Ichang. When writing of *P. obconica* I shall refer to this again. Whilst copious leaf-segmentation is unknown in wild *P. sinensis*, Lindl., it is a character

that is found within its clan, if I may so say, as the species about which I speak next shows.

Chinese Species of the Auganthus Section.
P. sinensis, Lindl. (Fig. 41.)

Section Filchnerae.

Primula Filchnerae, R. Knuth et Diels, is a plant discovered in 1904 on the Tsingling range of mountains near Sianfu. It is not exactly a close ally of *P. sinensis*, Lindl., but it has consanguinity. The feature in it which calls for special mention is the segmentation of the leaves. Each leaf is pinnatisect, the lobes are pinnatifid, and the ultimate lobules again toothed, even cleft in the lower leaf-segments. We may expect to discover other and grading forms. Meanwhile *P. Filchnerae*, R. Knuth et Diels, stands as a unique type.

Chinese Species of the Filchnerae Section.
P. Filchnerae, R. Knuth et Diels

Section Cortusoides.

This section has its chief development in Asia outside China. Of its eight species one is endemic in Japan—*P. kisoana*, Miq.; one is Japanese and Asiatic—*P. Sieboldii*, E. Morren; three are continental Asiatic—*P. cortusoides*, Linn., *P. Kaufmanniana*, Regel, *P. saxatilis*, Kom.; and three—*P. polyneura*, Franch., *P. Veitchii*, Duthie, *P. lichiangensis*, G. Forrest—are Chinese. The conspicuous ribbing of the calyx-tube and lobes associated with the leaf-form are the characters which distinguish the section.

P. Veitchii, Duthie, has been in cultivation since 1906, in which year it was introduced by Messrs. Veitch, having been raised from seeds collected by Wilson. It is one of the glories of our gardens: hardy, free-growing and free-flowering, and in every way an accommodating species. In 1908 Bees, Ltd., sent out **P. lichiangensis**, G. Forrest—described first of all by Forrest as *P. cortusoides* var. *lichiangensis*, G. Forrest. It resembles closely *P. Veitchii*, Duthie, from which it is distinguished by its less hairy foliage not white underneath and its more drooping larger flowers with larger eye and purple anthers; in *P. Veitchii*, Duthie, the anthers are yellow. Possibly *P. Veitchii*, Duthie, and *P. lichiangensis*, G. Forrest, are only minor forms of **P. polyneura**, Franchet.

It is germane to what I write about this section to say that *P. cortusoides*, Linn., is apparently a rare species nowadays in gardens, although gardening books tell us it has been in cultivation since 1791. There are many plants so called in cultivation, but they are either forms of *P. Sieboldii*, E. Morren, or are *P. saxatilis*, Kom. Professor Pax has made the relationship clear. *P. cortusoides*, Linn., is a plant of Western Siberia, extending from the Urals to the Altai, but not beyond. It is recognized by the short pedicels of the flowers.

P. saxatilis, Kom., is an Eastern Siberian plant—from the Altai and Alaschan eastwards into Amurland, Mandchuria, and Korea. It has flowers with long pedicels much exceeding the bracts, and is the Eastern representative of *P. cortusoides*, Linn. Both of them have adpressed calyx segments. *P. Sieboldii*, E. Morren, is a Japanese plant which is also indigenous in Transbaikalia and is at once diagnosed by its patent calyx segments. No one of these species is Chinese.

Chinese Species of the Cortusoides Section.

Rose pink flowers.

P. lichiangensis, G. Forrest (fig. 42)

P. polyneura, Franch.

P. Veitchii, Duthie (fig. 43)

Section Obconico-Listeri.

The forms which come into this section offer a problem worthy of study. We have a microcosm of variation to deal with. The characters of the group are in brief these—non-mealy rosette plants with petiolate rounded to ivy-shaped leaves, more or less hairy, producing scapes of varying length ending in umbels of lilac to white flowers, the calyx of which does not increase substantially around the fruit. There is a Chinese and a Himalayan representation. The Chinese is typified in *P. obconica*, Hance, which is in cultivation; the Himalayan in *P. Listeri*, King, which is not in cultivation. Of the latter we know little, of the former more, but not enough of either. The name Obconico-Listeri is given to the section to emphasize their relationship, which may perhaps prove to be so close as to sanction the section being regarded as an aggregate species—*P. obconico-Listeri*.

P. obconica, Hance, was collected in 1879 on the limestone rocks about Ichang, in West Hupeh, by Charles Maries, collector for Messrs. Veitch of Chelsea, and the plant was introduced by them in 1882. The advent of this species promised to herald a fine new race of Primulas for the garden, and under cultivation the plant has improved in the direction of larger flowers, larger trusses, and more intense colouring of the corolla. Its progress has been, however, scarcely so great as had been anticipated, and we may assign as a cause of this its possession of one property which must always be an obstacle to development of a horticultural plant, that of inducing troublesome irritation of the skin in some of those who handle it.

The characteristics of *P. obconica*, Hance, in our plant-houses need no description here, and they are all those of the plant from the limestone cliffs at Ichang, only upon an exaggerated scale. *P. obconica*, Hance, is a widespread plant over Western China, and in relation to habitat conditions it shows many variations in the form and stature of all its parts and in their hair-clothing, so much so that several of the forms it assumes have been described as distinct species. Whether these can be maintained as microforms within an aggregate must be determined by comprehensive investigation of many more specimens

than are now available; here I can only tell you that:—**P. ambita,** Balf. fil., is a glabrous form from a very dry site, with a remarkable involucre. **P. barbicalyx,** C. H. Wright, has, as its name implies, the calyx bearded, but the plant is very hairy all over, and has somewhat elongated leaves with rounded lobes. These characters are more emphasized in **P. oreodoxa**, Franch. This plant is the true *P. oreodoxa*, Franch., and is not in cultivation. The plant often met with in gardens under the name is *P. saxatilis*, Kom. **P. begoniaeformis,** Petitm., is a smaller form than the type and less hairy. **P. Bonatii,** R. Knuth, is not, I believe, a form deserving of a name—it shows no distinctive characters, but I hesitate to suppress the name without more knowledge of the plant. **P. parva,** Balf. fil., is a remarkable dwarf, small in all its parts, but characteristically xeromorphous. **P. Vilmoriniana,** Petitm., has leaves twice or thrice the usual size, associated with short scapes and minute flowers, the whole plant very hairy. **P. Petitmengini,** Bonati, is a grotto plant, also with large leaves, which are membranous and delicate, and the scapes are very short. **P. Cavalieri,** Petitm., shows an extreme type of the grotto plant, all its parts soft and the lobed membranous leaves, on long petioles, delicately thin. I have left to the last **P. sinolisteri,** Balf. fil. This is a plant of special horticultural interest. It was introduced in 1908 by BEES, Ltd., grown from FORREST'S seeds, and promises to be in our gardens what *P. obconica*, Hance, ought to have been, but is not. *P. sinolisteri*, Balf. fil., has not the irritant hairs. It is a free-grower, forming compact masses of dark green, acutely lobed leaves, and the trusses of white (sometimes lilac) flowers are many. In our northern climate it is not quite hardy—like true *P. obconica*, Hance, in that respect. It was sent out as *P. Listeri*, King—a venial error of naming—and the name *sinolisteri* has been given in the hope of making the change of nomenclature less disturbing. *P. sinolisteri*, Balf. fil., is, I am sure, a plant of horticultural merit. It has, moreover, particular botanical interest because it is the form in the whole series of which I am writing which shows conspicuous acute lobing of the leaf like that in the Himalayan type *P. Listeri*, King. That Himalayan type is in contrast with the Chinese *P. obconica*, Hance, a plant of wood and shade, but it too varies. The Manipur and the Kumaon forms of it differ markedly from the Sikkim, and the plant known as *P. filipes*, Watt, has the form of leaf characteristic of the typical Chinese *P. obconica*, Hance. Different as the Ichang *P. obconica*, Hance, and the Sikkim *P. Listeri*, King, appear, there is a wonderful series of uniting forms. Long ago Sir JOSEPH HOOKER recognized this, as did FRANCHET also at a later period when he definitely included a number of the Chinese forms in *P. Listeri*, King. His example was followed by FORREST. But there is one character that may point to a fundamental difference between the Himalayan and Chinese plants—the former gives off an odour like that of our *Geranium Robertianum*—so strongly indeed that Sir GEORGE WATT, the discoverer of the species, proposed to name

it *P. Robertianum*. There is no record of such odour in any of the Chinese forms.

I have placed on view a series of photographs of forms illustrating the variations rapidly sketched, and I offer the problem involved in this complex section to students of variation.

This variability in nature of the *obconica* type is from the outlook of Botany a problem of some interest, because in the thirty years during which the Ichang plant has been in cultivation there has not been the varietal progression one would expect, even after allowing for the handicap of its evil repute as an irritant; whilst *P. sinensis*, Lindl., a plant also of the limestone rocks at Ichang, of which in nature we have no record of variation—no wild forms spread over an area outside its limited home on the Yangtze—is in cultivation profuse, as we all know, in the wonderful outshoots of vegetative and flower character it makes. That there is a difference of constitution between the plants growing side by side in native habitat must have been recognized long ago by the Chinese, who have made much of *P. sinensis*, Lindl., but not of *P. obconica*, Hance, and our experience in Europe confirms Chinese empiricism. What we have to find out now is wherein is the essential difference in the species. It is opportune to present for investigation a case like this of two cohabiting species, attractive as they grow in nature, of cultural value, not distant in consanguinity, which outwardly present equally valid characters of adaptation, yet the one variable and consequently spreading in nature over a wide area but resistant in cultivation, the other so little variable in nature as to have a restricted boundary of distribution, and yet in cultivation the parent of innumerable varieties which are amongst the glories of horticultural skill. It is no simple problem, the factors involved are many, but the starting-point is admirably clear and definite in the two wild plants growing together on the same range of rocks.

Chinese Species of the Obconico-Listeri Section.

White to lilac flowers.

P. ambita, Balf. fil.
P. barbicalyx, Wright
P. begoniaeformis, Petitm.
P. Bonatii, R. Knuth
P. Cavalieri, Petitm.
P. obconica, Hance (fig. 44)
P. oreodoxa, Franch.
P. parva, Balf. fil.
P. Petitmengini, Bonati
P. sinolisteri, Balf. fil. (fig. 45)
P. Vilmoriniana, Petitm.

Section Geranioides.

The name adequately denotes the leading character of the section. The leaves are petiolate, and the lamina is lobed after the manner of a geranium. All the species have also a more or less campanulate or cup-shaped calyx, with lobes which are strict and divaricate in fruit, and they have red-purple drooping flowers. All the species

are apparently shade plants, and their distribution tells us to expect the discovery of other members of the section linking the forms already known.

There is a Himalayan representation in *P. geraniifolia*, Hook. fil., and *P. vaginata*, Watt, and the section appears in Japan through *P. jesoana*, Miq. From China we know three species—**P. septemloba,** Franch., **P. heucherifolia,** Franch., and **P. oculata,** Duthie, and they are in cultivation. *P. septemloba*, Franch., is a graceful plant, recalling somewhat *Cortusa Matthioli*. We owe it in our gardens to BEES, Ltd., who received seed from FORREST in 1906. Easily grown if surface wet is kept from it in winter. *P. heucherifolia*, Franch., a smaller plant, is even more graceful, for its flowers have a wider tube and more ample limb. It is the plant named by Petitmengin *P. Gagnepainii*, Petitm., and introduced under that name by Miss WILLMOTT from seed collected by WILSON. Both plants are hardy and require the treatment given to *Cortusa Matthioli*. *P. oculata*, Duthie, has darker flowers than the other Chinese species. It is one of WILSON's plants flowered by Messrs. VEITCH in 1904. I only know it from a dried specimen in Kew Herbarium of the cultivated plant, and it is perhaps no longer in cultivation.

Chinese Species of the Geranioides Section.

Rose-coloured or purple blue flowers.

P. heucherifolia, Franch.
P. oculata, Duthie
P. septemloba, Franch. (fig. 46)

SECTION PYCNOLOBA.

The species **P. pycnoloba**, Bur. et Franch., stands by itself amongst Primulas on account of its curious calycine evolution. The species was introduced to Horticulture in 1906 by Messrs. VEITCH, who received seed of it from WILSON. It is still an uncommon plant in gardens. From a group of petiolate hairy leaves with broad heart-shaped lamina, so common in plants of its alliance, there arises a short scape bearing a close cluster of flowers in which the calyx has enlarged as a long creamy-white membranous horn with wide mouth, from the edge of which extend the spike-like sepaline segments. Closing, as it were, the mouth of the horn is seen the small dark red limb of the corolla. There is nothing like it elsewhere in Primula. The species is easily grown if protected from overhead moisture when resting, and it spreads rapidly in the soil by root buds which provide a ready means of propagation.

Chinese Species of the Pycnoloba Section.

P. pycnoloba, Bur. et Franch. (fig. 47)

SECTION MOLLIS.

The type of this section is the Himalayan *P. mollis*, Nutt., the only Indian species of the section. China gives us three species:—

FIG. 43.—PRIMULA VEITCHII, Duthie

[*To face p.* 144.

FIG. 44.—PRIMULA OBCONICA, Hance. $\frac{3}{01}$ size.

Fig. 45.— Primula sinolisteri, Balf. fil

FIG. 46.—PRIMULA SEPTEMLOBA, Franch. $\frac{1}{4}$ size.

[*To face p.* 145

P. cinerascens, Franch., **P. sinomollis,** Balf. fil., and **P. violodora**, Dunn. Here again we have the Indo-Chinese relationship to which I have referred previously. All these plants have petiolate rounded leaves, gray through covering of hairs, and long scapes with tiers of red flowers, each flower with a cup-shaped to campanulate ribbed calyx forming straight erect lobes hardly accrescent.

Of the Chinese species *P. sinomollis*, Balf. fil. only is in cultivation, introduced by Mr. Williams in 1913, the seed collected by Forrest. It is a good plant and may rival *P. mollis*, Nutt., as an early-flowering species of the greenhouse.

Chinese Species of the Mollis Section.

Rich red flowers.

P. cinerascens, Franch.
P. sinomollis, Balf. fil. (fig. 48)
P. violodora, Dunn

SECTION MALVACEA.

Of the distinct forms of Primula included in SINENSIS by PAX none is more striking, because so unlike the Primula of common acceptation, than those of this section. **P. malvacea,** Franch., is not inappropriately named and may be taken as the type. It has large basal petiolate, nearly orbicular leaves, and sends up a long scape which bears at irregular intervals whorls of flowers, the calyx of which in fruit develops as a broad green leafy expansion, investing the small globose capsule much after the fashion, as FRANCHET has pointed out, of *Androsace maxima*. It has pale lilac flowers. A plant of the limestone in Yunnan, its texture reflects its environment. In **P. blattariformis,** Franch., also a limestone plant, the leaves form a close rosette and the flowers are more regularly spicate or racemed on the scape. A first glance at the plant suggests *Verbascum*, and FRANCHET has well named the species. It also has lilac flowers.

P. pintchouanensis, Petitm., and **P. bathangensis,** Petitm., are yellow-flowered forms closely resembling *P. malvacea*, Franch., perhaps only colour microforms of it. The former, in the type specimens which I have seen, is more of a xeromorph than *P. malvacea*, the veining in leaf and in the calyx under fruit being more prominent; the latter more hygrophilous, having somewhat membranous leaves, and the calyx expansion in fruit is also membranous. The habitat of the type specimens of *P. bathangensis*, Petitm., which I have seen is 'Vallée de Bathang, près des eaux chaudes,' and this suggests, that the diagnostic characters given for the species may be no more than those of a growth-form. **P. racemosa,** Bonati, described in 1909, I have not seen, but the description of it and the diagnostic characters given by Bonati suggest a doubt of its difference from *P. bathangensis*, Petitm. A sixth species of the section is **P. neurocalyx,** Franch., smaller than the others, but showing the typical features of the section. *P. Rosthornii*, Diels, is said by PETITMENGIN to be the same as *P. neurocalyx*, Franch. I have not seen specimens of *P. Rosthornii*,

Diels, but accept the determination of identity by PETITMENGIN, whose predilections were rather in an opposite direction.

Chinese Species of the Malvacea Section.

Lilac flowers.	Yellow flowers.
P. blattariformis, Franch.	*P. bathangensis*, Petitm.
P. malvacea, Franch. (fig. 49)	*P. pintchouanensis*, Petitm.
P. neurocalyx, Franch.	*P. racemosa*, Bonati

P. Paxiana, Gilg—a species from Shantung, the easternmost province of China—is included by PAX in his section SINENSIS. I have not seen it, and am unable to assign it a place in the sections I have named. It has a distinct physiognomy, and its home suggests that it may represent a group other members of which are yet to be discovered.

I have next to speak of a series of forms which have real kinship, but which fall naturally into three groups—CHARTACEA, DAVIDI, SONCHIFOLIA. These take in species which PAX placed in different sections, some in SINENSIS, some in BULLATAE, and some in his CANKRIENIA.

SECTION CHARTACEA.

Two Chinese species—**P. chartacea,** Franch., and **P. Veitchiana,** Petitm.— not yet in cultivation, have a physiognomy that brings them together in a group between those already referred to of PAX's section SINENSIS and the section DAVIDI, of which I shall speak next. Their clear-cut, glabrous, petiolate leaves, with round lamina, are a conspicuous feature, recalling somewhat the SINENSIS series, whilst their flower and fruit characters are more of section DAVIDI. I have not seen enough of them to warrant a fixed conclusion regarding their affinity. They are a natural combination.

Chinese Species of the Chartacea Section.

P. chartacea, Franch.
P. Veitchiana, Petitm.

SECTION DAVIDI.

To this section belong some of the most beautiful of Chinese Primulas. Large flowers, borne on trusses of stiff pedicels spreading on the top of a well-proportioned scape that rises from a rosette of oval-oblong sessile leaves with a more or less rugose surface, characterize the section; a cluster of scale-leaves of a rich brown colour invests the rosette. In fruit the scape elongates and the pedicels thicken conspicuously under the calyx. **P. Davidi,** Franch., is the type: a plant with rich purple flowers, collected by the Abbé DAVID in Muping. **P. ovalifolia,** Franch., was introduced by Messrs. VEITCH. and flowered with them about 1906. The seed was collected by

WILSON. Sir HARRY VEITCH informs me it is no longer in cultivation. I think it possible that two distinct plants are included in the *P. ovalifolia*, Franch. In this section I place at present **P. coerulea,** G. Forrest, which has the vegetative characters of the species already mentioned, but not those of the flower. There are two young plants of this at Edinburgh raised from seed taken from specimens collected by FORREST, and if they live to flower the place of the species can be determined. Here probably also belongs **P. breviscapa,** Franch., although its leaves are more membranous than in the others named. I also place here, until more is known of it, **P. Esquirolii,** Petitm., a plant collected by Bodinier in the province of Kweichow.

Chinese Species of the Davidi Section.

Purple and lilac-blue flowers.

P. coerulea, G. Forrest — *P. Davidi*, Franch.
P. breviscapa, Franch. — *P. Esquirolii*, Petitm.
P. ovalifolia, Franch.

SECTION SONCHIFOLIA.

Two species — **P. sonchifolia,** Franch., and **P. taraxacoides,** Balf. fil.—possess flower and fruit characters quite like those of species of the DAVIDI section, but have more or less runcinate leaves, which expand after the flower. They are like no others. Neither is in cultivation, but the large flowers with fringed petals of *P. sonchifolia*, Franch., make it a desirable species. It is the plant described by FORREST under the name *P. gratissima*, G. Forrest, and of which he speaks in glowing terms. Seedlings of it were raised in cultivation, but did not prosper.

Chinese Species of the Sonchifolia Section.

Lilac-blue flower.

P. sonchifolia, Franch.
P. taraxacoides, Balf. fil.

HEMSLEY used the name CAROLINELLA generically to include three species of plants collected by HENRY in the region of Mengtsz, South Yunnan. PAX reduced HEMSLEY'S genus *Carolinella*, making it a section of *Primula*, into which he brought the Caucasian *P. megaseaefolia*, Boiss., a very different plant. Excluding the Caucasian plant, I take PAX'S section for the present to include HENRY'S three Chinese plants which have an isolated and doubtful position in the genus.

SECTION CAROLINELLA.

The diagnostic character of the section is the fruit, which at dehiscence forms a fringe of many narrow teeth round the open mouth of the capsule from which the top has fallen. The physiognomy of two of the species—**P. Henryi,** (Hemsl.) Pax, and **P. Partschiana,** Pax—

is hardly primuloid. **P. obovata,** (Hemsl.) Pax, the third species, has more of a *Primula* form. The flowers are apparently purple. We know too little of these interesting species, no one of which is in cultivation. Their introduction is to be wished for on morphological as well as on horticultural grounds.

The species published in 1907 by PETITMENGIN under the name *P. cyclaminifolia,* Franch., as an ally of *P. chartacea,* Franch., is *P. Partschiana,* Pax.

Chinese Species of the Carolinella Section.

P. Henryi, (Hemsl.) Pax
P. obovata, Pax
P. Partschiana, Pax

PAX'S section PETIOLARES is based upon the Himalayan species *P. petiolaris,* Wall. This plant does not occur in China, although plants from there have been so named. The group is not a natural one, and I use it here for the present only because I do not know enough of the two Chinese species PAX includes in it to place them elsewhere.

SECTION PETIOLARIS.

The growth-form of this section is a rosette, but with the flowers on short scapes not rising much, if at all, above the foliage, and this rather than flower-character seems to mark the section. The section will require revision when we know more of the life-history of the plants in it. None of the Chinese species are in cultivation, and none of them rival the fine Himalayan member of the section—*P. Winteri,* Gill. The species mentioned by PAX are **P. odontocalyx,** Pax and **P. mupinensis,** Franch. To these I add **P. taliensis,** G. Forrest, and **P. vernicosa,** F. K. Ward, a curious dwarf from the Mekong-Salween Divide, with little claim to a place here. The plant referred to by FORREST as *P. petiolaris* var. *sulphurea,* Hook., is possibly *P. mupinensis,* Franch., of this section.

Chinese Species of the Petiolaris Section.

P. mupinensis, Franch.
P. odontocalyx, Pax
P. taliensis, G. Forrest
P. vernicosa, F. K. Ward

Types are mixed up in PAX'S section of MONOCARPICAE. The majority of the species in it form a natural group of great variability, and it is these which I take for the basis of the following section—MALACOIDES.

SECTION MALACOIDES.

This section is of horticultural interest because it includes *P. malacoides,* Franch., one of the popular plants of the day, and that species is its type. We have here to look at 'weeds' of cultivated

FIG. 47.—PRIMULA PYCNOLOBA, Bur. et Franch.

[*To face p.* 148.

FIG. 48.—PRIMULA SINOMOLLIS, Balf. fil. ½ size.

Fig. 49.—Primula malvacea, Franch.

FIG. 50.—PRIMULA FORBESII, Franch.

[*To face p.* 149.

areas and the neighbourhood of dwellings—rice-fields, pagodas, temples—and our acquaintance with the variations of plants in like places in our own country may prepare us for the multiplicity of forms within specific range which we observe in the Chinese plants. The facies of the plants is that of mealy herbs with rosettes or tufts of petiolate leaves, the lamina elliptic or rounded, more or less heart-shaped at base, and crenately lobed or incised at the margin. In smaller forms one scape, in larger many scapes, come from the tuft and each produces one umbel or a series of whorls of flowers, of which the cup-shaped calyx has divergent sharp lobes.

P. malacoides, Franch., the finest species in the section, we owe in cultivation to Bees, Ltd., who introduced it in 1908, raised from seed collected by Forrest. As a greenhouse plant it has established itself. The critical student of plant-form will find two forms of the plant—one more robust, with larger leaves, stouter scapes and pedicels, freely seeding, and another in every way a more delicate plant, which does not readily seed unless cross-pollinated. The former plant is the true *P. malacoides*, Franch.; the other has been named for garden purposes **P. pseudo-malacoides,** L. B. Stewart.

The species of the section that has been longest known in our gardens is the delightful **P. Forbesii,** Franch., which as we have it at present is a greenhouse perennial of easy cultivation. But the form first introduced under the name was truly monocarpic. *P. Forbesii*, Franch., is recorded from Burma, but I am not satisfied that the naming is correct.

These are the only species of the section in cultivation.

I am disposed to think that they are the only two specific types of the section, but others have been named. Some of these are certainly growth-forms which can be correlated with a modified environment. **P. androsacea,** Pax, is a very mealy form with compact rosettes, and often bears a profusion of short scapes, each with one umbel. It is a plant of drier sites in the rice-fields. **P. multicaulis,** Petitm., seems to be *P. androsacea*, Pax, only less mealy. **P. Willmottiae,** Petitm., is a plant of damp places, has a rosette of large membranous leaves, and develops tall, stout scapes, bearing flowers darker coloured than in the type. **P. delicata,** Petitm., is an annual growing near buildings at some elevation, and has thin leaves and delicate scapes. **P. Duclouxii,** Petitm., is a dwarf, growing on mountains amongst stones near water, and its scapes are quite short, often shorter than the leaves. **P. pellucida,** Franch., is a small annual of moist grottos in the limestone, producing translucent leaves and short scapes with few flowers. *P. speluncicola*, Petitm., and *P. debilis*, Bonati, are only *P. pellucida*, Franch. **P. Barbeyana,** Petitm., described as a species of this alliance, is at the most, if I may judge from the description of it, a microform like those I have mentioned. No one of these forms has horticultural interest, excepting, perhaps, *P. androsacea*, Pax, which is a brighter plant than *P. Forbesii*, Franch.

Chinese Species of the Malacoides Section.

Pale lilac-pink flowers.

P. androsacea, Pax
P. Barbeyana, Petitm.
P. delicata, Petitm.
P. Duclouxii, Petitm.
P. Forbesii, Franch. (fig. 50)
P. malacoides, Franch.
P. multicaulis, Petitm.
P. pellucida, Franch.
P. pseudo-malacoides, L. B. Stewart
P. Willmottiae, Petitm.

The section I am now about to refer to contains species that are disposed by PAX in his sections BULLATAE and FLORIBUNDAE. There is no more natural group of Primulas than that which I name SUFFRUTICOSA.

SECTION SUFFRUTICOSA.

On the limestone cliffs of Yunnan grows a race of undershrub Primulas of which we have in cultivation one—**P. Forrestii,** Balf. fil., collected by Forrest, and introduced in 1908 by BEES, Ltd. The undershrub habit is a rare one in *Primula*. We find it in the American *P. suffrutescens*, A. Gray, of the CUNEIFOLIA section, and in the Chinese *P. dryadifolia*, Franch., which by some characters might be placed here, in others recalls the SOLDANELLOID section in which PAX places it. The SUFFRUTICOSA section shows a considerable development in Yunnan. We know eight species. They form massive stems more than an inch across, ending in many-headed cushions of evergreen petiolate rugose leaves, with or without meal. The density of the cushion is increased by the persistence of desiccated old leaves. The flowers, typically enveloped in leafy bracts, are in umbels on projecting scapes or nestle amongst the leaves, sometimes one only on a scape. The calyx is characterized by a woody base.

P. Forrestii, Balf. fil., is now a well-known garden plant, not quite hardy—in the north at least—more resentful of damp than cold. Grown on a rockwork under glass it is a joy—the deep yellow of the flowers set off by the bright green of the foliage—and it scents the air with fragrance.

There are yellow-flowered and pink-flowered species in the section. *P. Forrestii*, Balf. fil., may be taken as typical of the yellow-flowered species, in which too the umbels are carried well above the leaves. **P. bullata**, Franch., and **P. rufa,** Balf. fil., are its comrades; both have golden meal, in the latter associated with hairiness, which is absent in the former. **P. pseudobracteata,** Petitm., is a like form without meal. Of the pink-flowered species **P. Monbeigii**, Balf. fil., and **P. Dubernardiana**, G. Forrest, have flowers much larger than those in other members of the group. **P. Henrici**, Bur. et Franch., has a single flower on the scape. I have not seen the plant and am not sure that it is rightly placed here. As elsewhere in the genus, this section has an Indian representation—not in the nearer area of the Eastern

Himalayas, but in Baluchistan, where *P. Lacei*, Hemsl. and Watt, a dwarf yellow-flowered plant, is an outlier.

Chinese Species of the Suffruticosa Section.

Pink flowers.	Yellow flowers.
P. Dubernardiana, G. Forrest	*P. bracteata*, Franch.
P. Henrici, Bur. et Franch.	*P. bullata*, Franch.
P. Monbeigii, Balf. fil.	*P. Forrestii*, Balf. fil. (fig. 52)
	P. pseudobracteata, Petitm.
	P. rufa, Balf. fil.

I have now to write about an assemblage of Primulas of which the striking character is drooping flowers. They are distributed by PAX through several of his sections, and in bringing them together here I arrange them in three sections which grade from one to the other—MUSCARIOIDES, SOLDANELLOIDES, AMETHYSTINA.

SECTION MUSCARIOIDES.

Recent discoveries of Eastern Primulas have brought to our knowledge no more interesting species than those which we may call, from their flower habit, the MUSCARIOID section. Of the nine forms of the section no one was in cultivation at the date of the last Primula Conference. The Sikkim *P. bellidifolia*, King, was the first known species and is the only known Indian species. In Szechwan, Yunnan, and bordering Tibet several species have been discovered and described during the last thirty years, and five of them are now in our gardens, namely—in the order of their introduction:—*P. deflexa*, Duthie; *P. Giraldiana*, Pax; *P. Littoniana*, G. Forrest; *P. pinnatifida*, Franch.; *P. Watsoni*, Dunn. The characteristic feature of the group is the aggregation of small flowers, which have tubular corollas with a short erect limb, in a close spike or capitulum, in which they are all inserted with the mouths of the corollas downwards. The flowers being sessile the down curvature takes place in the calyx and corolla, the consequence of which is that their posterior side is more developed than is their anterior side; the calyx in particular has the posterior segments much larger than the anterior ones. In each flower-bud the broad posterior and postero-lateral calycine lobes cover the rest of the flower, and the overlapping of the segments gives the surface of the young spike an imbricate look, as of a tiled roof. The opening of the flowers begins at the bottom of the spike and proceeds upwards, and as expansion proceeds we get the form which is so distinctive in the group, of a cluster of deflexed purplish or bluish narrow flowers surmounted by a cone of a different colour constructed by the unopened flowers, the calyces in which are coloured usually dark purple, or, it may be, as in *P. Littoniana*, G. Forrest, and *P. Viali*, Franch., a bright scarlet. The species rival one another in fragrance.

The first of the group to come into cultivation was **P. deflexa**, Duthie, the most fragrant of all as yet known, and perhaps also the

most hardy. It was raised by Messrs. VEITCH from seeds collected by WILSON and flowered in 1906. Then came in 1908 a batch of three species — the result of the exploration of Yunnan by FORREST—raised by BEES, Ltd.: **P. Giraldiana,** Pax., which is the true name for the plant of which seed was sent home by FORREST with the provisional name of *P. muscarioides*, under which it was published as a garden plant; **P. Littoniana,** G. Forrest, is the most remarkable of the three; first of all because of the length of its spikes —they reach sometimes six inches—and secondly because of its brilliant scarlet bracts, which contrast with the lavender or rose-lavender flowers; and **P. pinnatifida,** Franch., a delightful alpine with rich blue flowers. **P. Watsoni,** Dunn, was raised at Edinburgh in 1910 from seed sent by Mr. C. M. WATSON from Tatsienlu. It is not a species of much horticultural merit.

All these forms have leaves coated with soft hairs—a mark warning cultivators that dampness in the winter months will be resented. Our experience at Edinburgh is that they are difficult in this relation. *P. deflexa*, Duthie, seems to be the most adaptive. Whether or no it is that our insect life has not yet learned the way of these flowers, we find that seed is not freely set except after hand-pollination. This, in association with liability to damp off, seems to suggest that the group is one that will not be common in cultivation in the open.

True **P. Viali,** Franch., is a plant very like *P. Littoniana*, G. Forrest, but smaller, and wanting the hairs of *P. Littoniana*, G. Forrest —if they be distinct, and are not minor and major forms of one species, as DUNN has suggested. I lay emphasis on true *P. Viali*, Franch., because the *P. Viali* of PAX's Monograph is, as Mr. DUNN has shown, a chimæra including—*P. Viali*, Franch., *P. deflexa*, Duthie, *P. gracilenta*, Dunn, and *P. Watsoni*, Dunn. **P. cernua,** Franch., is a species of great promise for our gardens; its truss is large and the flowers are a good blue. **P. gracilenta**, Dunn, the only other known Chinese species of the series is not in cultivation and does not promise to be of value horticulturally.

Chinese Species of the Muscarioid Section.

Blue to lilac flowers.

P. cernua, Franch.
P. deflexa, Duthie (fig. 53)
P. Giraldiana, Pax (fig. 54)
P. gracilenta, Dunn
P. Littoniana, G. Forrest (fig. 55)
P. pinnatifida, Franch. (fig. 56)
P. Viali, Franch.
P. Watsoni, Dunn (fig. 57)

SECTION SOLDANELLOIDES.

From the MUSCARIOID section there is a natural grading into the section SOLDANELLOIDES—that which contains the gems of the Primula world. Imagine the limb of the corolla of one of the Muscarioids expanding until it attains a bell-form and you get the distinctive feature of the Soldanelloids. This transition is well seen in the two

FIG. 51.—PRIMULA MAXIMOWICZII, Regel. (*Gard. Chron.*)
(Much reduced.)

[*To face p.* 152.

FIG. 54.—PRIMULA GIRALDIANA, Pax

[*To face p.* 153.

Chinese species—**P. penduliflora,** Franch., and **P. nutans,** Franch.—neither of them yet in cultivation, unfortunately, for they are beautiful plants. The enlargement of the corolla carries with it necessity for more room, and the flowers in the inflorescence are therefore fewer in number and frequently reduced to one.

The best known members of the section are Himalayan. Here belong those prizes of cultivation *P. sapphirina,* Hook. fil., *P. Reidii,* Duthie, *P. uniflora,* Klatt, and *P. Watti,* King; and when we have *P. soldanelloides,* Watt, we shall have the whole of the described Himalayan species.

Of the Chinese species one only has been in cultivation—**P. spicata,** Franch. I say 'has been.' It is monocarpic, and, failing to set seed in the first year of its introduction, its life in cultivation was but a shadow. It is, I think, the most beautiful Primula I have seen—azure-blue flowers softened with silver meal. It differs from all other species in the separation of the flowers in an open spike. BEES, Ltd., introduced it to cultivation from seed collected by FORREST. I hope that either FORREST or KINGDON WARD will be able to re-introduce this lovely form. **P. incisa,** Franch., has much-cut leaves after the fashion of the BELLA section. **P. argutidens,** Franch., and **P. Faberi,** Oliv., are other members and have leaves with a distinctive horny margin. *P. Faberi,* Cliv., has yellow flowers. In this section, as in others, we have the Himalayan and Chinese connexion shown. Further acquaintance with Chinese Primulas will probably compel revision of the section as outlined here. *P. spicata,* Franch., is the typical form. *P. nutans,* Franch., and *P. penduliflora,* Franch., ought perhaps to be an independent section. *P. argutidens,* Franch., and *P. Faberi,* Oliv., also differ from the type in their foliage, as does *P. incisa,* Franch.

Chinese Species of the Soldanelloid Section.

Lilac-purple-blue flowers.	Yellow flowers.
P. argutidens, Franch.	*P. Faberi,* Oliv.
P. incisa, Franch.	
P. nutans, Franch.	
P. penduliflora, Franch.	
P. spicata, Franch. (fig. 58)	

SECTION AMETHYSTINA.

The species of the SOLDANELLOID section have the sessile flowers of the MUSCARIOID section with but a slight attempt at pedicels. Section AMETHYSTINA shows us species with drooping flowers of the SOLDANELLOID type on pedicels longer or shorter. The leaves have a horny margin. This is their characteristic. They are as beautiful as the Soldanelloids. No one of them is in cultivation. The transition from Soldanelloides is through two delicate species of apparently high altitudes—**P. Fargesii,** Franch., and **P. silaensis,** Petitm., in which perhaps we get a closer similarity to the form of Soldanella

than in other species. *P. nutantiflora*, Hemsl., is *P. Fargesii*, Franch. The pedicels in these species are very slender, and the number of flowers reduced sometimes to one. More robust species are **P. amethystina,** Franch., and **P. brevifolia,** G. Forrest, the purple-blue flowers in the truss being sometimes six. The section has representation in the Himalayas in *P. Kingii*, Watt, which Indian collectors describe as a wonderful plant with claret-coloured bell-flowers. A future study of the forms included here will probably result in the separation of the delicate *P. Fargesii*, Franch., and *P. silaensis*, Petitm., from the others.

Chinese Species of the Amethystina Section.

Purple-blue flowers.

P. amethystina, Franch. — *P. Fargesii*, Franch.
P. brevifolia, G. Forrest — *P. silaensis*, Petitm.

Taking the section MUSCARIOIDES as a starting-point, the chain of forms leading through SOLDANELLOIDES to AMETHYSTINA is not the only one that we can trace. By it we arrive at forms with pendulous flowers on long flexible pedicels. Following another route on which also pedicellate development takes place but the pedicels become strict, we pass through the section SPHAEROCEPHALA and reach section DENTICULATA, with its extension FARINOSA.

SECTION SPHAEROCEPHALA.

I wish I could have used the name CAPITATA here, because of its suggesting that the well-known *P. capitata*, Hook., belongs to the section, as it does. PAX has, however, used the name for one of his sections embracing in addition to *P. capitata*, Hook., species that find their right place in MUSCARIOIDES and in DENTICULATA.

The flowers in this section are aggregated in a capitular truss at the end of the scape, and they have the shape of and droop like those in the section MUSCARIOIDES and show the same apical crown as the flowers successively expand from below upwards. But the flowers have short stalks, and this makes all the difference to their form, because downward curvature takes place in the pedicel, not in the flower itself. The irregularity observable in the flowers of the species of the MUSCARIOID section is here almost absent. The calyx is only slightly oblique.

The section illustrates once more the relationship betwixt the Himalayan and the Chinese forms of *Primula*. *P. capitata*, Hook., of the Himalayas is represented in China by **P. sphaerocephala,** Balf. fil. The physiognomic resemblance between the two species is deceptive, and the Chinese plant has been supposed to be *P. capitata*, Hook., which, as CRAIB suggests, is probably an aggregate species. Both species are in cultivation—*P. capitata*, Hook., since 1850, when it flowered at Kew, the plant being raised from seed sent from India by Sir JOSEPH HOOKER, and side by side their likeness and difference

are readily seen. The seed of *P. sphaerocephala*, Balf. fil., was collected by FORREST for BEES, Ltd., who introduced the plant in 1908.

A second species of this section in Yunnan is **P. pseudocapitata,** F. K. Ward. Its description is not yet published. KINGDON WARD collected seed, some of which was presented to us by BEES, Ltd. Plants raised from this in the Royal Botanic Garden, Edinburgh, flowered in 1912. It has purple flowers in smaller trusses than in *P. capitata*, Hook.

There are other forms in China, but they, like the Indian ones, have still to be investigated.

Chinese Species of the Sphaerocephala Section.

Purple-blue flowers.

P. pseudocapitata, F. K. Ward.
P. sphaerocephala, Balf. fil.

SECTION DENTICULATA.

In this series the flowers of the truss are on distinct pedicels of varying length. They get room, therefore, for expansion and are quite regular.

The Indian **P. denticulata,** Smith, was introduced to cultivation by Messrs. VEITCH in 1842. It has been recorded as a Chinese plant —as growing at Mengtsz—but I have not seen specimens and am disposed to doubt the identification. The type is otherwise well developed in China, and I have specimens of some three or four plants that are perhaps new species of this section which await critical investigation. Of already described forms **P. pseudodenticulata,** Pax, is in cultivation, an early flowerer even before the Indian *P. denticulata*, Smith, but of little value for horticulture. It was introduced by BEES, Ltd., in 1908, seed having been collected by FORREST. **P. efarinosa**, Pax, seems to find its place here. It is said to be in cultivation but I have not seen it. **P. polyphylla** (Franch.) Petitm., is a remarkable plant, not yet in cultivation, which has a copious rosette of leaves and truss of flowers with auriculate bracts after the fashion of *P. auriculata*, Lam., with which it was at first confused. **P. nessensis,** G. Forrest, another of the introductions of BEES, Ltd., in 1911 from seed collected by FORREST, is a bright species with pink flowers, of considerable merit both for the outside garden and for greenhouse cultivation.

Chinese Species of the Denticulata Section.

Purple flowers.

P. denticulata, Sm. (fig. 59) *P. nessensis*, G. Forrest (fig. 60)
P. efarinosa, Pax *P. polyphylla* (Franch.) Petitm.
P. pseudodenticulata, Pax

The section FARINOSAE as now constituted by PAX contains the two sections FARINOSAE and AURICULATAE of his earlier publication. I propose to revert to the old division.

Section Farinosa.

World-wide as is the distribution of this section through *P. farinosa*, Linn., it is poorly developed in China in two species only of the northern areas. **P. sibirica,** Jacq., is recorded from West Kansu eastwards to North Shensi and beyond, and shows some variations in consequence which have not yet been properly studied. As a plant of cultivation it completes its centenary in five years' time and still holds its place.

Of **P. Loczii,** Kanitz, a plant of Kansu, considered by Pax to be a form of *P. borealis*, Duby, and placed in this section, I know nothing. Its geographical distribution as given by Pax suggests mistaken identity. It is a far cry from Alaska to Kansu, and these are the two areas from which the plant is said to come.

Chinese Species of the Farinosa Section.

Lilac-rose flowers.

P. Loczii, Kanitz
P. sibirica, Jacq.

Section Auriculata.

Auriculata is a typical Central Asiatic section of *Primula*, and no representatives of it are known in China south of Kansu and North Szechwan. It is the type of *Primula* that we may expect more of when Kansu is more fully explored. The Chinese species are all small, even miniature, and have thick spathulate leaves with a broad prominent midrib, a calyx with segmental ribs, and pergamentous intervals in the calyx-tube between the ribs. **P. stenocalyx,** Maxim., is the longest-known species. *P. leptopoda*, Bur. et Franch., is *P. stenocalyx*, Maxim., and **P. Biondiana,** Petitm., one of Wilson's plants, is doubtfully distinct. In cultivation is or has been **P. cognata**, Duthie, one of Purdom's finds raised by Messrs. Veitch in 1906. Its light-bluish purple flowers are said to be delightfully scented. I think that **P. Prattii,** Hemsl., a yellow-flowered plant collected by Pratt, should find its place here, but the only specimens of it, which are at Kew, are fragmentary. It has no affinity with either *P. Stuartii*, Wall., or *P. pulchella*, Franch., with which it has been compared.

Chinese Species of the Auriculata Section.

Blue or purple flowers.	Yellow flowers.
P. Biondiana, Petitm.	*P. Prattii*, Hemsl.
P. cognata, Duthie	
P. stenocalyx, Maxim.	

I have now to mention a dozen or so of Chinese species which are distributed in various sections by Pax, tentatively in many instances. Only one of them is yet in cultivation, but herbarium specimens tell us that some are lovely alpines which collectors ought to look for. My grouping of them, based upon hurried examination, all for which I have had opportunity, is merely suggestive.

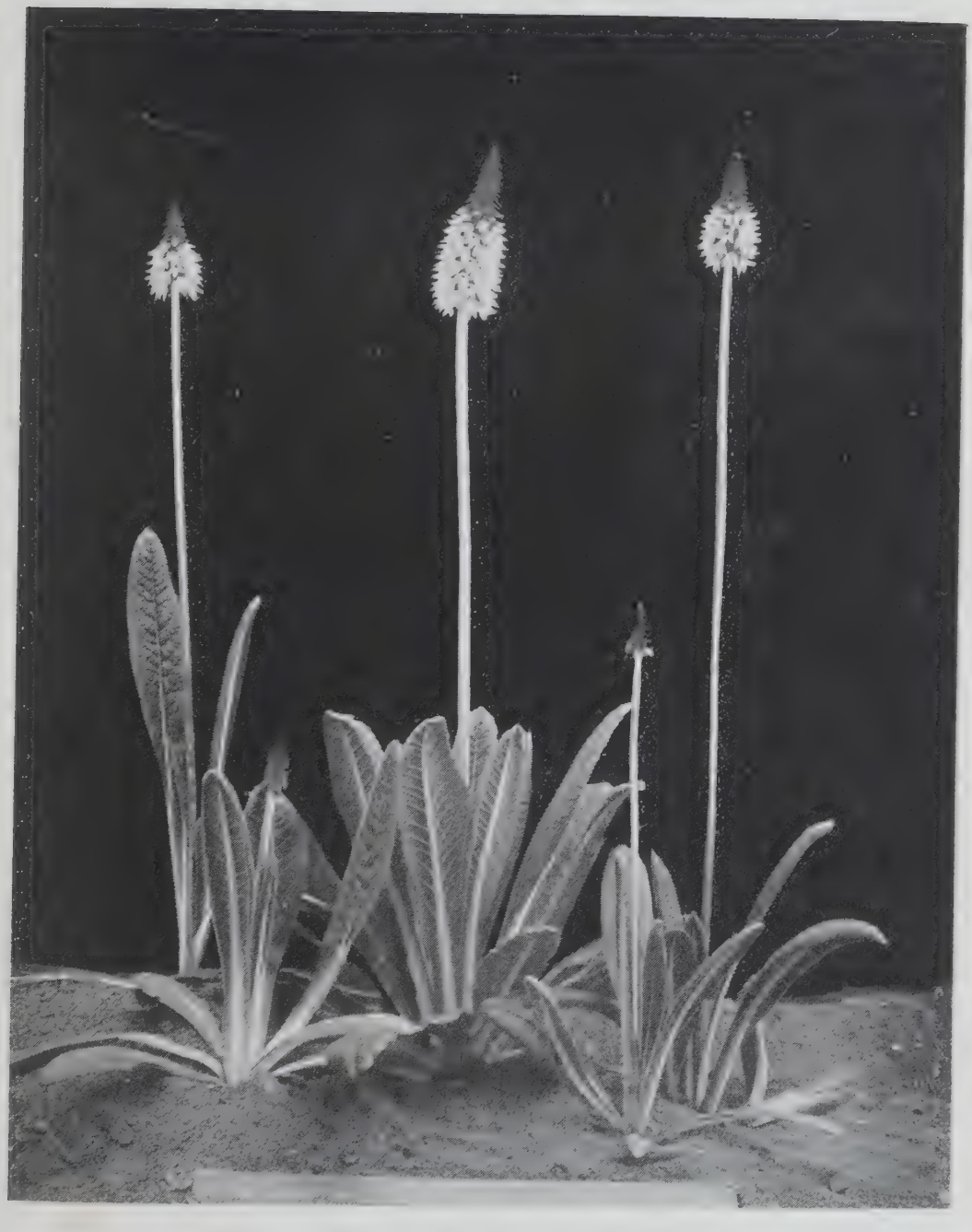

FIG. 55.—PRIMULA LITTONIANA, G. Forrest

[*To face p.* 156.

FIG. 56.—PRIMULA PINNATIFIDA, Franch. ½ size.

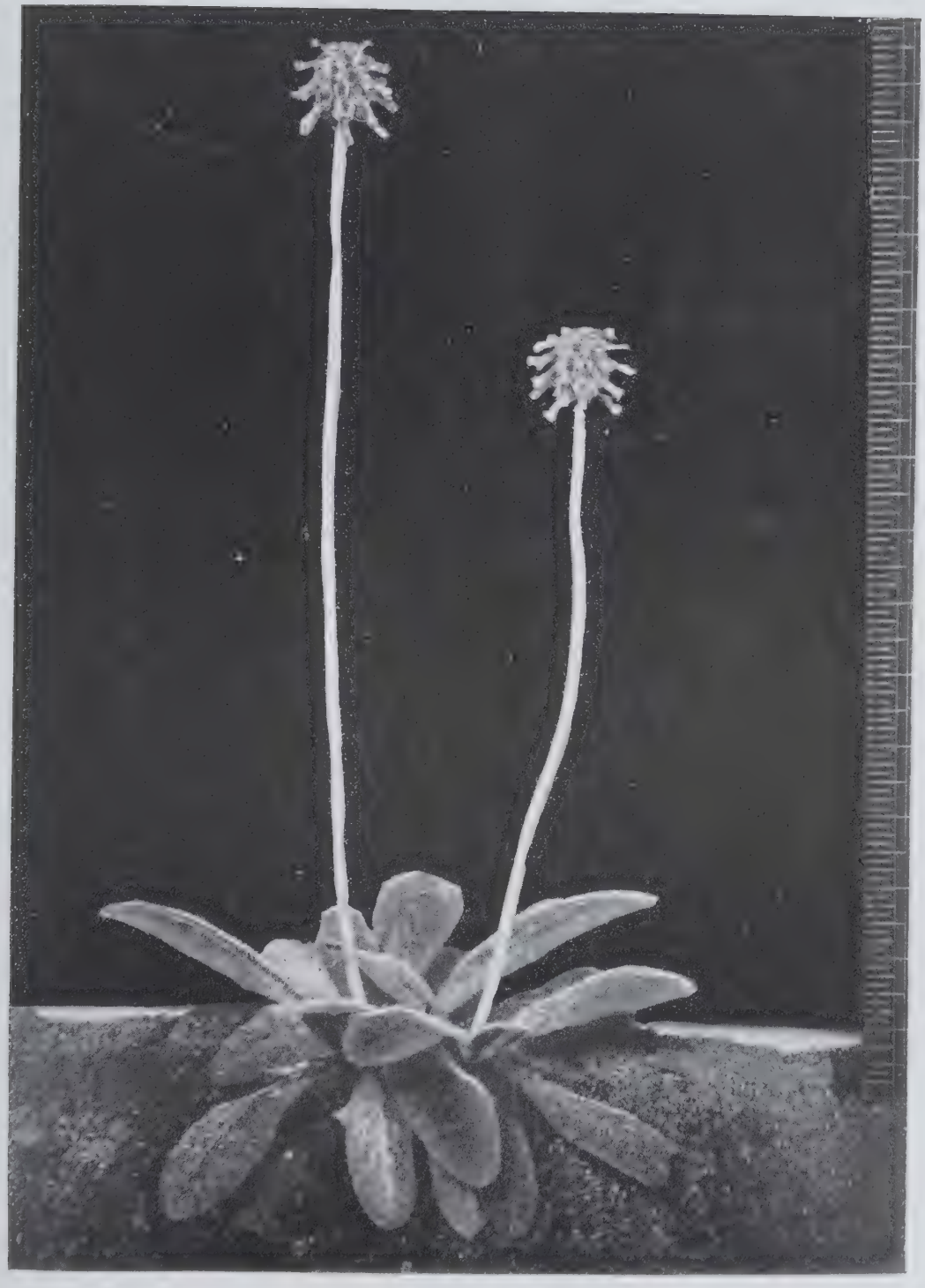

FIG. 57.—PRIMULA WATSONI, Dunn

FIG. 58.—PRIMULA SPICATA, Franch.

[To face p. 152

Group Sertulum.

Three species with oblong or spathulate leaves, bracts not swollen at the base, and a small open campanulate calyx, seem to have affinity —**P. sertulum,** Franch., from Tatsienlu ; **P. pumilio,** Maxim., a minute alpine from Kansu ; and **P. Knuthiana,** Pax, which has come into cultivation in course of the last two or three years, by whom introduced I do not know.

Chinese Species of the Sertulum Group.

P. Knuthiana, Pax (fig. 61) *P. pumilio,* Maxim.
P. sertulum, Franch.

Group Glacialis.

The three species I have to name here are beautiful alpines with oblong or spathulate rosulate thick leaves and large deeply coloured flowers both in calyx and corolla. **P. glacialis,** Franch., is a plant of the Lichiang Glacier. **P. zambalensis,** Petitm., comes from a high altitude on the hills farther north at Batang and Dzambala. **P. yargongensis,** Petitm., which I have not seen, comes from the same place as the last named and is its near ally. Collectors who read this will please look out for these plants.

Chinese Species of the Glacialis Group.

P. glacialis, Franch. *P. yargongensis,* Petitm.
P. zambalensis, Petitm.

Group Tongolensis.

P. tongolensis, Franch., and **P. sinuata,** Franch., are species with large flowers, the corolla-tube an inch long, and their spathulate or oblong and toothed leaves have a cartilaginous margin. The flowers are either solitary or two to three in an umbel, and the calyx—bright green—has somewhat overlapping lobes. These plants come, the first from Tungngolo near Tatsiculu, the other from the region of Tali. Both ought to be in cultivation. *P. tongolensis,* Franch., has no near kinship with the Soldanelloides, amongst which Pax places it.

Chinese Species of the Tongolensis Group.

P. sinuata, Franch.
P. tongolensis, Franch.

Group Souliei.

Two species with petiolate leaves—the toothed broad lamina abruptly passing into the petiole—and flower showing more or less the calyx of the Auriculata section are **P. Souliei,** Franch., and **P. urticifolia,** Maxim. The former is said to have blue flowers, and comes from the province of Kiala, in the north of Szechwan ; the latter is a small plant of Kansu. Neither is in cultivation. The species **P. flava,** Maxim., from Kansu, is one of the few Chinese species of which

I have seen no specimens, and I place it here mainly because of the foliage as described.

Chinese Species of the Souliei Group.

Purple flowers.	Yellow flowers.
P. Souliei, Franch.	*P. flava*, Maxim.
P. urticifolia, Maxim.	

Section Macrocarpa.

The section named Macrocarpae by Pax after the endemic Japanese species *P. macrocarpa*, Maxim., with which he associated several other species, is unnatural from my point of view. I have removed all the species to other sections excepting *P. macrocarpa*, Maxim., and *P. nipponica*, Yatabe, another endemic Japanese species which Pax took to be a variety of *P. macrocarpa*, Maxim. Along with these two species to which I refer when writing of the Japanese Primulas should be associated two other species—**P. Hemsleyi,** Petitm., a mauve-flowered plant collected by Wilson in bogs about Tatsienlu, and **P. gemmifera,** Batalin, a Kansu plant which produces bulbils in the axils of the leaves. Pax associated this species with *P. malacoides*, Franch., and *P. Forbesii*, Franch., a relationship which I do not recognize. The plants have petiolate leaves with elliptic lamina, and the campanulate calyx is cut half-way down. The section comes near the section Cuneifolia, but is distinguished from it by the form of calyx and by the cylindric fruit projecting far beyond the calyx.

Chinese Species of the Macrocarpa Section.

P. gemmifera, Batalin
P. Hemsleyi, Petitm.

Pax did good service in clearing up the confusion that long prevailed regarding colour-forms of the Himalayan species *P. Stuartii*, Wall., and in showing that it is a distinct yellow-flowered species and all the purple forms assigned to it are microforms of *P. nivalis*, Pallas. This question of yellow and purple flowers within the same species is a subject deserving attention as an oxydase problem. Except in the Vernales section, yellow and purple in the corolla-limb of Primulas seems to be diagnostic, although the eye and the tube of a purple may show yellow, and a yellow may occasionally show a flesh tint, as is the case, Mr. W. W. Smith tells me, in *P. obliqua*, W. W. Smith, a Himalayan plant of the section I am now writing about. Mr. Smith also writes to me: "The aggregate *P. Dickieana*, Wall. + *P. Pantlingii* King, is a striking—the only—species of the Himalayas which shows great colour variation in the same spot. It is very variable, and the observer sees at a glance that it is no question of confusion of species, or hybridism. The *locus* is isolated and there is no question of intermixture." Duthie also states that the corolla of *P. tangutica*, Duthie, varies from yellow to dark chocolate or almost black.

If PAX had emphasized farther the differences he brought out and separated in a definite section *P. Stuartii*, Wall., and its near ally *P. sikkimensis*, Hook. fil., from the series of *P. nivalis*, Pallas, his grouping would have been more natural. The section NIVALES as instituted by PAX seems to me to include three phyla, and from this point of view I propose to deal with the Chinese species he mentions and others which come into the alliance making the three sections —SIKKIMENSIS, NIVALIS, MAXIMOWICZII.

SECTION SIKKIMENSIS.

Every gardener knows **P. sikkimensis,** Hook. fil., with its clusters of long toothed leaves and tall scapes bearing each an umbel of many gracefully drooping yellow fragrant flowers, coated more or less with white meal from which come narrow cylindric fruits projecting far beyond the calyx. By the pond or in openings in a wood it grows freely, requiring no attention, although it, like other Eastern Primulas, responds to treatment as a triennial. It is the type of the section and was introduced to cultivation in 1851 from Kew, the seed being sent by Sir JOSEPH HOOKER. It is recorded as a Chinese plant, but I am not yet satisfied that it is so. But the section is represented in China in two plants recalling true *P. sikkimensis*, Wall., but with shorter and in one case broader leaves and larger flowers—these are **P. pseudo-sikkimensis,** G. Forrest, and **P. microdonta,** Petitm. Both are in cultivation, introduced by BEES, Ltd., in 1908 through seed collected by FORREST. Another fine species is **P. orbicularis,** Hemsley. Introduced by Messrs. Veitch in 1906, seed having been obtained from WILSON, the plant died out after flowering, Sir HARRY VEITCH informs me. **P. tsetzouenensis,** Petitm., may also be placed for the present in this section. Its foliage differs from what is usual, for the leaves are petiolate after the fashion of those in species of PAX's section CORDIFOLIA with which it may hereafter have to be grouped. With some doubt I include also **P. reflexa,** Petitm.

Whilst yellow is the only colour in the flowers of Himalayan members as yet known, in China we have purple flowers also, and in two charming species—**P. secundiflora**, Franch., and **P. vittata,** Franch. *P. vittata*, Franch., is in cultivation, introduced in 1905 by Messrs. VEITCH from seed collected by WILSON. Its drooping pink-purple flowers, the calyx banded with white meal, make it an acquisition, and it is hardy. *P. secundiflora*, Franch., is also in cultivation, introduced by BEES, Ltd., in 1908 from FORREST'S seeds. It is so like *P. vittata*, Franch., that the two plants may easily be confused, but *P. secundiflora*, Franch., has oblong elliptic leaves horizontal in a rosette. *P. vittata*, Franch., has elongated erect leaves. The relation is somewhat that which we find between *P. Poissoni*, Franch., and *P. Wilsoni*, Dunn. Given perfect typical plants, mistake in identification is impossible, but there are stages where diagnosis is not easy.

Chinese Species of the Sikkimensis Section.

Purple flowers.	Yellow flowers.
P. secundiflora, Franch. (fig. 62)	*P. microdonta*, Petitm.
P. vittata, Franch. (fig. 63)	*P. orbicularis*, Hemsl.
	P. pseudosikkimensis, G. Forrest (fig. 64)
	P. reflexa, Petitm.
	P. sikkimensis, Hook. fil. (fig. 65)
	P. tsetzouenensis, Petitm.

Section Nivalis.

The Nivalis section contains some of the finest of Primulas. The flower-trusses are invariably large, as are the flowers themselves, and these are commonly more blue than purple. The dark purple calyx, with its long segments lined internally with a mealy coat which shows more or less between them, is characteristic, and then in fruit the cylindric capsule, much grosser than in the Sikkimensis section, projects far out of the calycine tube. The foliage is no less distinctive. It commonly follows the flower in expansion, and the individual leaves, somewhat thick and riband-shaped, are in varying degree coated with silver or golden meal.

P. nivalis, Pallas, is the type of the section, and is found in every region where Primulas grow, excepting South America. The species extends right across the Asiatic continent from the Alps of the Caucasus, through the high lands of Turkestan, and following the great Asiatic Divide over the Himalaya into the high area of the Tibeto-Chinese frontier, and north-east over the Altai and Transbaikalia into Kamtschatka; thence over the bridge of the Kurile Islands and Aleutian Islands into north-west America.

An area in occupation of such extent invites adaptations, and these are not wanting in the species, and yet in all its many forms there is a specific physiognomy which expresses without question relationship. Notwithstanding, *P. nivalis*, Pallas, whether typical or in any of its forms, is a rare plant in cultivation. Introduced to cultivation in 1790, a decorative plant, the one hundred and twenty years that have elapsed since its coming ought to have seen it established as a garden plant. Why has it failed? I take it, difficulties of cultivation are responsible. Speaking from experience at Edinburgh, I can say that it is one of those plants that have the unfortunate habit of disappearing—rotting off at the collar through damp while the roots remain healthy. It wants to take its water from below and to have the base of the rosette kept dry. This is true of all the species in the section.

Its typical form does not occur in China, but the species appears in definite microforms which run parallel with the Himalayan ones. **P. sinopurpurea,** Balf. fil., and **P. sinoplantaginea,** F. K. Ward, are the Chinese microforms corresponding to *P. purpurea*, Royle, and *P. plantaginea*, Watt, of the Himalayas. *P. sinopurpurea*, Balf. fil., is in cultivation—another of the plants we owe to Bees, Ltd., through

FIG. 59.—PRIMULA DENTICULATA, Sm.

[*To face p.* 160.

Fig. 60.—Primula nessensis, G. Forrest

FIG. 61.—PRIMULA KNUTHIANA, Pax (*Veitch*).

FIG. 62.—PRIMULA SECUNDIFLORA, Franch. $\frac{7}{10}$ size.

Fig. 63. Primula vittata, Franch.

FIG. 65.—PRIMULA SIKKIMENSIS, Hook. f.

FIG. 66.—PRIMULA PULCHELLA. Franch. ⅓ size.

[To face p. 108

their collector, FORREST. It was raised in 1911. It is a splendid species, enveloped in golden meal. This is the plant which PAX names as var. *simensis* of *P. nivalis*, Pallas. In 1905 Messrs. VEITCH introduced a plant raised from WILSON'S Chinese seeds under the name of *P. nivalis* var. *farinosa*, Schrenk. It died out after flowering, Sir HARRY VEITCH tells me. As true *P. nivalis* var. *farinosa* is not known to occur nearer China than Turkestan and has a restricted area of distribution, it is not likely that WILSON'S plant was this microform—more probably it was *P. sinopurpurea*, Balf. fil.

The NIVALIS phylum appears otherwise in China in two species which ask for the attention of horticulturists. **P. calliantha,** Franch., is a superb species, of which FORREST sent home seeds, but the young plants did not reach the stage of flower. More fortunate in its history is **P. pulchella**, Franch., which BEES, Ltd., introduced in 1911 from the same source. So far it has proved less sensitive to our damp climate than others of this section. **P. pulchelloides**, F. K. Ward, is a smaller plant than *P. pulchella*, Franch., has smaller flowers and fewer of them. It also is in cultivation—BEES, Ltd., the introducers in 1911 ; KINGDON WARD the collector of the seeds.

There is a wonderful plant of this section—**P. albiflos**, F. K. Ward —growing on the lofty area about Atuntzu, on the Mekong-Salween Divide. It has white flowers—a pair of them at the end of the scape. This is a plant of which we may hope KINGDON WARD will obtain seeds during his present journey.

Then I must not omit to mention here—for it is apparently a member of the NIVALIS section—**P. Purdomi**, Veitch, which at the moment of writing I only know by the figure and account of it in the gardening papers.

Chinese Species of the Nivalis Section.

Blue and purple flowers.	White flowers.
P. calliantha, Franch.	*P. albiflos*, F. K. Ward
P. pulchella, Franch. (fig. 66)	
P. pulchelloides, F. K. Ward (fig. 67)	
P. Purdomi, Veitch (fig. 68)	
P. sinoplantaginea, Balf. fil.	
P. sinopurpurea, Balf. fil.	

SECTION MAXIMOWICZII.

The NIVALIS section has developed a distinct race in North China, typified in **P. Maximowiczii,** Regel, and characterized by a greater restraint in the flower-development. The flowers are smaller in all parts; the calyx is no longer the prominent dark-coloured envelope, and the corolla-lobes have become narrow and are reflexed at full anthesis. There are three species which have been at times looked upon as forms of one. *P. Maximowiczii*, Regel, is in cultivation. It was raised in 1906 by Messrs. VEITCH from seed collected by WILSON. It is a rich

red-flowered species. In **P. tangutica,** Duthie, the flowers are said to vary from yellow to chocolate or almost black. It was raised by Messrs. VEITCH from WILSON'S seeds in 1905, and these plants had dark flowers, and again from PURDOM'S seed. Regarding the name, I may explain: the plant appears in PAX'S *Monograph*, published in November 1905 as *P. tangutica*, Pax; in the *Gardeners' Chronicle* of July 1905 DUTHIE described it under the same name. DUTHIE as the authority has priority over PAX. As matter of fact, both botanists took the name from the ticket attached by MAXIMOWICZ to herbarium specimens collected by Potanin in 1885. MAXIMOWICZ named the plant as var. *tangutica*, Maxim., of *P. Maximowiczii*, Regel. This varietal name was never published. A third species is the yellow-flowered **P. szechuanica,** Pax—said to be also in cultivation raised by Messrs. VEITCH from PURDOM'S seed.

Chinese Species of the Maximowiczii Section.

Purple flowers.	Yellow flowers.
P. Maximowiczii, Regel (fig. 51)	*P. szechuanica*, Pax

Yellow and purple flowers.

P. tangutica, Duthie

I now write of a set of Primulas which differ from all others in possessing large—a couple of inches across—solitary ebracteate flowers on scapes rising from a sheath of later developing leaves, a calyx cut to the base into five to eight segments, and flat seeds with a wide wing aril. FRANCHET, who had exceptionally good material for study of the plants, grouped them in a section of *Primula*, naming it OMPHALOGRAMMA. Later he made the section a genus distinct from *Primula*. PAX reduces the genus to a section again. I follow him here, and until examination of living flowering and fruiting specimens justifies judgment.

SECTION OMPHALOGRAMMA.

The section OMPHALOGRAMMA includes five species which in their distribution show the relationships between the Himalayan and Chinese flora upon which I have commented in speaking of other sections. One species, *P. Elwesiana*, King, is a Sikkim plant, the other four are Chinese—**P. Delavayi,** Franch., on the Tali range of mountains, is the southernmost species; **P. vincaeflora,** Franch., occurs further north on the Lichiang range; and **P. Franchetii,** Pax, the most northern species and apparently the rarest, grows on the Mekong-Salween Divide about Yarkalo and Tseku. **P. Engleri,** R. Knuth, if it is different from *P. Franchetii*, Pax, which I greatly doubt—at least there is no character in KNUTH'S description of it that does not apply equally well to *P. Franchetii*, Pax—would carry the northern distribution of the section eastwards to Tatsienlu. The plants have quite the facies of the Himalayan monotypic genus *Bryocarpum* (*B. himalaicum*, Hook. fil. et Thoms.), a yellow-flowered plant with a transversely dehiscing

capsule and not so compressed a seed. *Bryocarpum* cannot, therefore, include the Omphalogrammas, but these may be regarded as forms a step nearer *Primula* than *Bryocarpum*.

Three of the five species are now in cultivation, but I have no knowledge of the flowering of any one of them as yet. They are apparently slow growers, and show in perhaps a higher degree than other species the generic sensitiveness to water. They are described as plants of the banks of streams, marshes, or moist meadows. At Edinburgh *P. vincaeflora*, Franch., which we have grown for some five years now without being able to coax it into flower, thrives best when kept well flooded with water under ample drainage conditions. *P. Delavayi*, Franch., of which our plants are two years old, seems to like the same treatment. These Chinese species were introduced, the former in 1908, the latter in 1911, by BEES, Ltd., through Forrest. *P. Elwesiana*, King, from Calcutta seed, we have now in its third year.

Chinese Species of the Omphalogramma Section.

Purple flowers.

P. Delavayi, Franch. — *P. Franchetii*, Pax
P. Engleri, R. Knuth — *P. vincaeflora*, Franch.

In China there are several pleasing miniature species, of turfy habitats, which resemble one another in their possession of oblong or spathulate incised leaves more or less mealy—either silver or golden—from which ascend, sometimes no more than an inch from the foliage, delicate scapes bearing a single flower or a few-flowered umbel. PAX has distributed the species of which I write in his sections MACROCARPAE, SOLDANELLOIDES, and TENELLAE. They form, however, a natural phylum which has branched, and as I look at the species they fall into three sections :—BELLA, MINUTISSIMA, YUNNANENSIS.

SECTION BELLA.

The species of this section are recognizable amongst all Primulas by their possession of a dense white cushion of hairs blocking the throat of the lilac-purple corolla. They are small-growing species, with more or less spathulate incised and toothed leaves, carrying a white meal. As in other sections, there is a Himalaya and a China distribution. At present we know but two species—*P. pusilla*, Wall., from Sikkim (in cultivation), and **P. bella**, Franch., from China, which is in cultivation, introduced by BEES, Ltd., in 1908, from seed collected by FORREST. Herbarium material shows that *P. bella*, Franch., is an aggregate, and of its microforms there is a delightful dwarf, forming cushions covered with large flowers after the fashion of *Saxifraga oppositifolia*, and it is worthy a distinct name. **P. Bonatiana**, Petitm., is a plant which may not be even a definite microform of *P. bella*, Franch., the absence of meal—its only diagnostic character

—being a fluctuating one in this series. I have seen but a fragmentary specimen.

Chinese Species of the Bella Section.

Lilac-purple flowers.

P. bella, Franch. (fig. 69)

P. Bonatiana, Petitm.

Section Minutissima.

One Chinese species—**P. diantha**, Bur. et Franch.—seems to have its nearest ally in the Himalayan *P. minutissima*, Jacquem., and I therefore name it here as in Pax's section Minutissimae, which includes the Himalayan plant. But I do not yet place it definitely, and the section Minutissima will probably require recasting. *P. diantha*, Franch., is a minute lilac-flowered species known only in specimens collected by Prince Henri d'Orléans in the high area near Batang.

Chinese Species of the Minutissima Section.

Lilac flowers.

P. diantha, Bur. et Franch.

Section Yunnanensis.

This section includes small species with farinose meal—golden or silver—leaves oblong, closely, regularly toothed, forming compact rosettes. The scapes are slender, usually exceeding the leaves, and the flower-truss is composed of from two to six lilac-purple flowers, usually on stalks or nearly sessile, always more or less mealy.

There are five species, and four are in cultivation. One of them—**P. yunnanensis**, Franch.—is not a free grower. Its flowers are in pairs on long, slender stalks. It is often confused with **P. kichanensis**, Franch., which is the plant met with in gardens under the name *P. Clementinae*, G. Forrest. *P. kichanensis* is easily grown and is a free flowerer, distinguished from *P. yunnanensis*, Franch., by its almost sessile flowers. The spreading calyx, after flowering with its mealy upper surface, is a conspicuous mark of it as of *P. yunnanensis*, Franch. **P. umbrella**, G. Forrest, resembles *P. kichanensis*, Franch., in many points, but has a shorter scape and a calyx without long, sharp lobes. **P. membranifolia**, Franch., is one of the best of the series as a garden alpine. The bright green of its leaves is a delightful setting to the colour of its flowers. The flowers are remarkable in that, when they open, they are quite small, but gradually they enlarge to twice their first size. These four species were introduced by Bees, Ltd., in 1908. Seed was collected by Forrest. **P. kialensis**, Franch., is not in cultivation. It seems to stand midway between *P. yunnanensis*, Franch., and *P. kichanensis*, Franch.

FIG. 67.—PRIMULA PULCHELLOIDES, F. K. Ward. $\frac{7}{10}$ size.

[*To face p.* 164.

Fig. 68.- Primula Purdomi. Veitch

Fig. 69.—Primula bella, Franch.

Fig. 70.—Primula kichianensis, Franch.

FIG. 71.—PRIMULA MEMBRANIFOLIA. Franch.

Chinese Species of the Yunnanensis Section.

Lilac-purple flowers.

P. kichanensis, Franch. (fig. 70) *P. membranifolia*, Franch. (fig. 71)
P. kialensis, Franch. *P. umbrella*, G. Forrest (fig. 72)
P. yunnanensis, Franch. (fig. 73)

SECTION DRYADIFOLIA.

I have not yet satisfied myself regarding the right position of **P. dryadifolia**, Franch.—one of the finest of Primulas. FRANCHET suggested that its place was near *P. uniflora*, Watt. That would bring it into our section SOLDANELLOIDES, and PAX adopts FRANCHET's suggestion. The outward flower-character strongly tempts one to follow this lead, but the habit of the plant is altogether foreign to plants in the SOLDANELLOID group. The suffruticose habit takes one to SUFFRUTICOSA. There also we find pink flowers. But the leaves in *P. dryadifolia*, Franch., as well as the secund sessile large drooping flowers, seem to forbid the association. In the circumstances I sit on the fence until study of the living plant gives more data, and I place it here after the group I have just dealt with because we may yet find links indicating a relationship. The opportunity for that, I hope, will soon occur. At Edinburgh we have young plants in their third year of growth. The introduction of the plant we owe to BEES, Ltd., and FORREST. Imagine a plant of *Dryas* studded over in profusion with clusters of bright rose-coloured flowers girt by dark purple bracts, each cluster standing an inch or two above the cushion of foliage—that is what we shall have when the plant comes into our gardens.

Chinese Species of the Dryadifolia Section.

Rose-coloured flowers.

P. dryadifolia, Franch.

In his section CANKRIENIA, PAX has brought together a number of species whose affinity with one another is certain, but unfortunately he tacked on to them other species of altogether different relationship and spoiled his section. Here I take the five allied species from his section and, adding others that have become known since PAX wrote, institute for them the section CANDELABRA.

SECTION CANDELABRA.

The section is thoroughly natural. All the species are plants of moist meadows, and produce large usually primrose-like leaves in a cluster, from which a tall scape ascends, producing at intervals whorls of stalked flowers before it ends in an umbel. The whole inflorescence is candelabroid. The bract and calyx-characters give diagnostic specific marks. The fruit is uniform—a round capsule enclosed in a slightly accrescent and woody calyx, and more or less marked on the

summit by an embossed rosette thickening, from the middle of which the style protrudes.

Fifteen species come into the section, and they form two colour-groups—a purple-flowered and a yellow-flowered. Their distribution is interesting. One purple-flowered species—*P. japonica*, A. Gray—is endemic in Japan; another—*P. Miyabeana*, Ito et Kawakami—is endemic in Formosa. Two yellow-flowered ones are confined to the Himalayas—*P. prolifera*, Wall., on the Khasia Hills, and *P. Smithiana*, Craib, in Sikkim. One, also yellow-flowered—*P. imperialis*, Jungh.—occurs in Java, and is the southernmost Asiatic species of the genus *Primula* as we know it at present. The rest are limited to China, and the orange or yellow-flowered Chinese species *P. Cockburniana*, Hemsl., about Tatsienlu, *P. serratifolia*, Franch., and *P. Bulleyana*, G. Forrest, on the Mekong-Salween Divide, and *P. helodoxa*, Balf. fil., on the hills about Tengyueh, form a chain connecting the Himalayan with the Javan species.

Ten of them are in cultivation. They are the plants of everybody—free growers and free flowerers if adequate root-moisture is present. *P. imperialis*, Jungh., is the only one that is not quite hardy in the north. They lend themselves readily to hybridization, and what has already been obtained from them by crossing forecasts splendid results in the future.

Of the six purple-flowered Chinese species **P. Poissonii**, Franch., has been longest in cultivation, introduced in 1890 by the Jardin des Plantes, Paris. Then in 1905 came **P. pulverulenta**, Duthie and **P. Wilsoni**, Dunn, from Messrs. VEITCH—the outcome of WILSON's collecting. *P. Wilsoni*, Dunn, sometimes known as *P. angustidens*, Pax, is a near ally of *P. Poissonii*, Franch., but has longer and narrower leaves, smaller flowers and more of them. **P. Beesiana**, G. Forrest, raised by BEES, Ltd., from FORREST's seeds in 1908, is the latest of the purple series to come into our gardens, and it is perhaps the freest grower of the four. The species yet to be secured are **P. glycosma**, Petitm., a plant scented in all its parts, and **P. mallophylla**, Balf. fil., not unlike *P. japonica*, A. Gray, and confused with it in the past.

P. Cockburniana, Hemsl., we have known longest of the four yellow-flowered Chinese species, and no one of the later comers rivals it in the depth of its orange flower. It is not a long-lived plant. Discovered by PRATT, the seed of it was collected by WILSON and plants raised from it by Messrs. VEITCH in 1905. The three others are a result of FORREST's collecting. Two of them—**P. Bulleyana**, G. Forrest, and **P. serratifolia**, Franch.—came through BEES, Ltd., in 1908. The coloration of the flower of *P. serratifolia*, Franch., is curious. The petals are pale yellow, with a lemon-tinted blotch in the centre. It is not so free a grower as some of the others. Let me note here that the *P. serratifolia* described in PAX's *Monograph* is a chimera including *P. Beesiana*, G. Forrest, *P. pulverulenta*, Duthie, and *P. serratifolia*, Franch. **P. helodoxa**, Balf. fil., is the latest of FORREST's species. It was collected in 1912 for Mr. J. C. WILLIAMS, and should

be in our gardens this season. It is a magnificent plant, of strong growth, producing many whorls of large dark yellow flowers.

Chinese Species of the Candelabra Section.

Purple flowers.	Yellow flowers.
P. Beesiana, G. Forrest (fig. 74)	*P. Bulleyana*, G. Forrest (fig. 77)
P. glycosma, Petitm.	*P. Cockburniana*, Hemsl. (fig. 78)
P. mallophylla, Balf. fil.	*P. serratifolia*, Franch. (fig. 79)
P. Poissonii, Franch. (fig. 75)	*P. helodoxa*, Balf. fil.
P. pulverulenta, Duthie (fig. 76)	
P. Wilsoni, Dunn	

* * * * * * * *

The claims of your Secretariat compel an even more cursory treatment in what follows of the Primulas not coming under European or Himalayan. I make four chapters :—Asiatic Species of Primula neither Himalayan nor Chinese ; African Species of Primula ; Japanese Species of Primula ; American Species of Primula.

I begin with the

"ASIATIC SPECIES OF PRIMULA NEITHER HIMALAYAN NOR CHINESE."

Some forty species, including microforms, come into the area prescribed. They belong to nine sections, of which three are peculiar to the area of the Caucasus and Armenia and the region immediately eastwards—in fact that portion of Asia spoken of by Botanists as the Orient is richest in forms. In it the VERNALES develop colour forms absent from the section as it is found in Europe. The sections CORTUSOIDES, NIVALIS, FARINOSA, and CUNEIFOLIA are those which spread out into farther Asia. SREDINSKYA with yellow flowers and MEGASEAEFOLIA with red flowers are endemic in the Caucasus. VERTICILLATA is South Arabian.

The following list gives the species and their microforms. I have not included synonymy, which is somewhat complex.

ASIATIC SPECIES OF PRIMULA NEITHER CHINESE NOR HIMALAYAN.

P. acaulis (Linn.) Hill. (Sect. VERNALIS.) Armenia—to Europe. Cult.

Microforms :—

P. heterochroma, Stapf. North Persia.

P. Sibthorpii, Hoffmannsegg. Caucasus, Armenia, North Persia—to Thessaly. Cult.

P. algida, Adam. (Sect. AURICULATA.) Pontus, Caucasus—to Altai. Cult.

P. amoena, Bieb. (Sect. VERNALIS.) Caucasus and Armenia. Cult. Introd. 1831.

P. Aucheri, Jaub. et Spach. (Sect. VERTICILLATA.) Arabia.

P. auriculata, Lam. (Sect. AURICULATA.) Armenia, Caucasus, Persia —to Afghanistan. Cult. 1784.

P. baldschuanica, Fedtsch. (Sect. AURICULATA.) Turkestan.

P. Bayernii, Rupr. = **nivalis** microform.

P. borealis, Duby. (Sect. FARINOSA.) Tschuktschiland.

P. Boveana, Decne = **verticillata** microform.

P. capitellata, Boiss. (Sect. FARINOSA.) Persia, Afghanistan.

P. Columnae, Ten. = **officinalis** microform.

P. cordifolia, Rupr. = **elatior** microform.

P. cortusoides, Linn. (Sect. CORTUSOIDES.) Urals to Altai. Cult. Introd. 1791.

P. cuneifolia, Ledeb. (Sect. CUNEIFOLIA.) East Siberia—to Japan and Aleutian Islands.

P. darialica, Rupr. (Sect. FARINOSA.) Caucasus. Cult.

P. davurica, Spreng. = **farinosa** microform.

P. ELATIOR (Linn.), Hill. (Sect. VERNALIS.) In its microforms :—

P. cordifolia, Rupr. Caucasus, Armenia.

P. Pallasii, Lehm. Urals, Caucasus, Armenia, North Persia. Cult.

P. pseudoelatior, Kusnetzow. Caucasus.

P. eximia, Greene = **nivalis** microform.

P. farinosa, Linn. (Sect. FARINOSA.) Baikal, Siberia, Mongolia, Europe, North America. Cult.

Microform :—

P. davurica, Spreng. Through Siberia and North Mongolia. North America. Cult. 1809.

P. Fedtschenkoi, Regel. (Sect. uncertain.) Turkestan.

P. grandis, Trautv. (Sect. SREDINSKYA.) Caucasus. Cult.

P. heterochroma, Stapf = **acaulis** microform.

P. Juliae, Kusnetzow. (Sect. VERNALIS.) Caucasus. Cult. Introd. 1910.

P. Kaufmanniana, Regel. (Sect. CORTUSOIDES.) Turkestan. Cult.

P. longiflora, All. (Sect. FARINOSA.) Caucasus, Armenia—to Europe. Cult.

P. longipes, Freyn et Sintenis = **nivalis** microform.

P. luteola, Rupr. (Sect. AURICULATA.) Caucasus. Cult. Introd. 1867, Peter Buck, St. Petersburg.

P. macrocalyx, Bunge = **officinalis** microform.

P. megaseaefolia, Boiss. (Sect. MEGASEAEFOLIA.) Pontus. Cult. Introd. 1896, Dammann according to Pax. Introd. to Britain by Miss Willmot, 1901.

P. nivalis, Pallas. (Sect. NIVALIS.) Caucasus to Baikal—to Himalaya, China, Japan, Aleutian Islands. Cult. 1790.

Microforms :—

P. Bayernii, Rupr. Caucasus.

P. eximia, Greene. Aleutian Islands—to Japan.

P. longipes, Freyn et Sintenis. Pontus.

P. pumila, (Regel) Pax. Tschuktschiland.

P. turkestanica, Regel. Turkestan. Cult.

FIG. 72.—PRIMULA UMBRELLA, G. Forrest

FIG. 73.—PRIMULA YUNNANENSIS, Franch. $\frac{3}{4}$ size.

[*To face p.* 168.

FIG. 74.—PRIMULA BEESIANA, G. Forrest

Fig. 52.—Primula Forrestii, Franch.

Fig. 76.—Primula pulverulenta, Duthie

[To face p. 169

P. OFFICINALIS (Linn.) Hill. (Sect. VERNALIS). In its microforms :—

P. Columnae, Ten. Pontus. Cult.

P. macrocalyx, Bunge. Songaria to Armenia. Cult.

P. Olgae, Regel. (Sect. AURICULATA.) Caucasus.

P. ossetica, Kusnetzow. (sect. FARINOSA.) Caucasus.

P. Pallasii, Lehm. = **elatior** microform.

P. pseudoelatior = **elatior** microform.

P. pumila = **nivalis** microform.

P. Ruprechtii, Kusnetzow. (Sect. VERNALIS.) Caucasus.

P. saxatilis, Komarov. (Sect. CORTUSOIDES.) Korea to Altai. Cult.

P. sibirica, Jacq. (Sect. FARINOSA.) Central Asia to Kansu, Himalaya, Altai, Dahuria.

P. Sibthorpii, Hoffmannsegg = **acaulis** microform.

P. Sieboldii, E. Morren. (Sect. CORTUSOIDES.) Transbaikalia to Japan. Cult. Introd. 1861, Veitch. Coll. J. G. Veitch.

P. turkestanica, Regel = **nivalis** microform.

P. verticillata, Forsk. (Sect. VERTICILLATA.) South Arabia. Cult. Microform :—

P. Boveana, Decne. Sinai. Cult.

The distribution in sections is :—

SECTION CORTUSOIDES.

The CORTUSOIDES section has its chief development in Northern Asia. When writing of the Chinese species the distribution of *P. cortusoides*, Linn., *P. saxatilis*, Kom., and *P. Sieboldii*, E. Morren, the three chief species of the section, was mentioned. One only has to be added—**P. Kaufmanniana,** Regel—a Turkestan species. All are in cultivation. True **P. cortusoides,** Linn., is rare nowadays, at least I find it so. All the plants that have come in my way are of **P. saxatilis,** Kom. In cultivation the readily recognized diagnostic mark—very short pedicels in *P. cortusoides*, Linn., very long pedicels in *P. saxatilis*, Kom.—is a valid one. Possibly *P. saxatilis*, Kom., ought to be regarded as a microform of *P. cortusoides*, Linn., carrying its area of spread right across North Asia.

The readiest technical character by which to tell **P. Sieboldii,** E. Morren, from these two species is the spreading calyx-segments on a narrow calyx-tube. In *P. cortusoides*, Linn., and *P. saxatilis*, Kom., the tube is broader at base and the segments are erect. *P. Kaufmanniana*, Regel, although its short-pedicelled flowers recall *P. cortusoides*, Linn., is readily distinguished by its more rounded leaves with incised lobes.

P. cortusoides, Linn., is said to have come into cultivation in 1794—following *P. nivalis*, Pallas, as the third extra-European species introduced, whilst it was the first extra-European species described. *P. Sieboldii*, E. Morren, was brought in by Messrs. VEITCH through Mr. J. G. VEITCH in 1861. Of *P. Kaufmanniana*, Regel, I have no history. We have grown it at Edinburgh since 1905 from seed obtained from a collection of plants made by N. D. SOCALSKI. *P. saxatilis*,

Kom., has been grown for long as *P. cortusoides*, Linn., and has come in probably under that name. The *P. oreodoxa* of gardens is this plant.

Asiatic Species (neither Himalayan nor Chinese) of the Cortusoides Section.

Rose to lilac-blue coloured flowers.

P. cortusoides, Linn.
P. Kaufmanniana, Regel
P. saxatilis, Kom. (fig. 80)
P. Sieboldii, E. Morren (fig. 81)

Section Verticillata.

The development in South-West Arabia and Abyssinia of a type of yellow-flowered Primula which is elsewhere represented by a single species—*P. floribunda*, Wall.—in Afghanistan and the West Himalayas is a fact of distribution which, at first stating astonishing, ceases to be so when the many floristic relationships of the regions are fully appreciated. I interpolate here—the species *P. Lacei*, Hemsl. & Watt, brought into this section by Pax, finds its right place in Suffruticosa.

P. Aucheri, Jaub. et Spach., and **P. verticillata**, Forsk., are two species which dwell on moist rocks in the area named—the former a rare and little-known species, the latter one of the best-known species in our gardens, into which it was introduced so long since as 1825 through the Botanic Garden at Berlin. Two microforms of *P. verticillata*, Forsk., are recognized—**P. Boveana**, Decne, and *P. simensis*, Hochst., the latter the form which occurs in Abyssinia. The differences between *P. verticillata*, Forsk., and these microforms are slight and have not always been recognized in gardens. Indeed, the plant introduced as *P. verticillata* and figured in the "Botanical Magazine" in 1828 is the microform *P. Boveana*, Decne.

As a greenhouse plant *P. verticillata*, Forsk., and its microforms have paramount claims which, however, are endangered by that wonderful hybrid *P.* × *kewensis*, Watson, a spontaneous cross between *P. verticillata*, Forsk., and the Indian *P. floribunda*, Wall., a plant in which students of genetics are finding what promises to be of scientific and horticultural importance.

Asiatic Species (neither Himalayan nor Chinese) of the Verticillata Section.

Yellow flowers.

P. Aucheri, Jaub. et Spach. *P. Boveana*, Decne.
P. verticillata, Forsk.

Section Vernalis.

The Asiatic development of this section, which includes our common European primrose, cowslip, and oxlip, is remarkable in this, that it gives us colour forms other than yellow. To these Asiatic forms our gardens owe much. I need not specify here the characters of this well-known section.

The Asiatic centre of the section is the Caucasus and Armenia. *P. elatior*, (Linn.) Hill, occurs freely there in its microforms **P. cordifolia,** Ruprecht, **P. Pallasii,** Lehm., and **P. pseudoelatior,** Kusnetzow, and does not leave the area. On the other hand, *P. officinalis*, (Linn.) Hill, is there rare in its microform **P. Columnae,** Ten., but as **P. macrocalyx,** Bunge, is the member of the section which spreads out from the centre through Asia as far as the Altai. **P. Ruprechtii,** Kusnetzow, represents the European *P. leucophylla*, Pax.

Some of these have been and are in cultivation, but they have not influenced horticulture, nor do they promise to influence it, as have the other members of the section.

The ordinary form of **P. acaulis,** (Linn.) Hill, is found in several parts of Armenia, and a curious hairy microform of it—**P. heterochroma,** Stapf—appears in North Persia. But the microform known as **P. Sibthorpii** Hoffmannsegg, or as *P. acaulis* var. *rubra*, Sibth. & Sm., is the red-flowered plant spread from Greece through the Caucasus to North Persia, which is a parent of all our forms of pink, red, purple, and blue primroses.

No less important from the gardening standpoint is another member of this section, **P. amoena,** Bieb., a name over which there has been much writing in gardening papers in old days. The purple-flowered *P. amoena*, Bieb., stands to *P. Sibthorpii*, Hoffmannsegg, in the same relation as *P. elatior*, (Linn.) Hill, to *P. acaulis*, (Linn.) Hill—the one has a scape, the other is scapeless. *P. amoena*, Bieb., was introduced to cultivation in Britain in the thirties of last century, and was then figured in the "Botanical Magazine." It is a delightful species which varies greatly in nature, but in recent years it seems to have dropped out of cultivation. The plant commonly cultivated as *P. amoena*, Bieb., is *P. Sibthorpii*, Hoffmannsegg. There is an excuse for this, inasmuch as both the plants were originally included by Bieberstein in his description of *P. amoena*, Bieb. Further confusion in the nomenclature has been introduced by the use of the name *P. altaica*, because *P. amoena*, Bieb., has been called in gardens *P. altaica*, so has *P. Sibthorpii*, Hoffmannsegg, and its products; then the microform of *P. elatior* known as *P. Pallasii*, Lehm., was named in the first instance by Pallas *P. altaica*, and lastly the plant figured as *P. intermedia*, Sims, in the "Botanical Magazine" for 1809, is a form of *P. farinosa*, Linn., for which Lehmann primarily used the name *P. altaica*, and to this plant the name rightfully belongs. It were better were the name *P. altaica* dropped altogether.

Included by Pax in this section—and I treat it here although I do not think it is in the right place—is a charming *Primula* of recent introduction—*P.* Juliae, Kusnetzow. The plant is Caucasian, and was discovered only in 1901—a fact that may give us hope for other treasures when the Caucasus is more fully explored. I believe it was introduced to cultivation through Sündermann, but its first recorded flowering in this country was at the Oxford Botanic Garden in 1911. It is a free grower, liking moisture, and producing an

abundant crop of red flowers which nestle on the surface of the rounded leaf-blades.

Asiatic Species (neither Himalayan nor Chinese) of the Vernalis Section.

Yellow flowers.	Purple and Pink flowers.
P. acaulis, (Linn.) Hill	*P. amoena,* Bieb.
P. Columnae, Ten.	*P. Juliae,* Kusnetzow
P. cordifolia, Ruprecht	*P. Sibthorpii,* Hoffmannsegg
P. heterochroma, Stapf	
P. macrocalyx, Bunge	
P. Pallasii, Lehmann	
P. pseudoelatior, Kusnetzow	
P. Ruprechtii, Kusnetzow	

Section Farinosa.

Through forms of **P. sibirica,** Jacq., and the microform **P. davurica,** Spreng., of **P. farinosa,** Linn., this section appeals to cultivators. The forms have been in our gardens since the thirties of last century. *P. davurica,* Spreng., is the *P. altaica,* Lehm., and the oldest of the plants cultivated under that name as I have explained under section Vernalis. **P. longiflora,** All.—an old favourite of cultivation—is now recorded as a Caucasian and Armenian plant, but its area is Europe. **P. darialica,** Rupr., is a small farinose species of the Caucasus, and has come into gardens, I think, through Sündermann within the last few years. **P. capitellata,** Boiss., is a very mealy dwarf species of Persia and Afghanistan, and has its flowers crowded in a mealy head, on the outside of which the purple tips of the calyx-lobes are conspicuous. It might be a useful rock plant, for it grows at high altitudes. The dwarf farinose microform **P. borealis,** Duby, completing the list, comes into it as a plant of the extreme north-west of Asia. Perhaps **P. ossetica,** Kusnetzow, from the Caucasus, belongs to the section.

Asiatic Species (neither Himalayan nor Chinese) of the Farinosa Section.

All lilac flowers.

P. borealis, Duby	*P. farinosa,* Linn.
P. capitellata, Boiss.	*P. longiflora,* All.
P. darialica, Rupr. (fig. 82)	*P. ossetica,* Kusnetzow
P. davurica, Spreng.	*P. sibirica,* Jacq.

Section Auriculata.

In this section come good garden plants. **P. algida,** Adam, has been long known, also **P. auriculata,** Lam. They are plants of the Caucasus to Afghanistan and Altai. **P. luteola,** Rupr., said to have come into cultivation through Peter Buck, of St. Petersburg, in 1867, is one of the hardiest of plants and deserves more attention than

FIG. 77.—PRIMULA BULLEYANA, G. Forrest

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Fig. 78.—Primula Cockburniana, Hemsl.

Fig. 79.—Primula serratifolia, Franch. $\frac{3}{5}$ size.

Fig. 80.—Primula saxatilis, Komr.

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it receives. Adding **P. Olgae,** Rupr., a species not far removed from *P. auriculata;* Lam., endemic in the Caucasus, and **P. baldschuanica,** Fedtsch., a Turkestan plant, I have named all the certain species of the section.

Asiatic Species (neither Himalayan nor Chinese) of the Auriculata Section.

Blue and Purple flowers.	Yellow flowers.
P. algida, Adam	*P. luteola,* Rupr.
P. auriculata, Lam.	
P. baldschuanica, Fedtsch.	
P. Olgae, Regel	

SECTION NIVALIS.

The evolution of this section in Northern Asia is its maximum. We have true **P. nivalis,** Pallas, and in addition the microforms :— **P. Bayernii,** Rupr., a white-flowered form from the Caucasus, its leaves beaded along the margin with mealy teeth. **P. eximia,** Greene, only touches North Asia in Tschuktschiland—its main distribution is through the Aleutian and Kurile Islands. **P. turkestanica**, Regel, is the *P. nivalis* var. *farinosa* of Schrenk, a plant strictly limited to Turkestan. **P. longipes,** Freyn et Sintenis, grows in Pontus as a strikingly robust form even in this robust alliance, and it has large flowers with long drooping pedicels. Lastly, **P. pumila,** (Regel) Pax, is the dwarf *P. nivalis* of Tschuktschiland.

I may add here that the white-flowered plant commonly grown in gardens as *P. nivalis* is a form of the European *P. hirsuta,* All. It is figured by Sims in the " Botanical Magazine " of 1809 under the name *nivea,* and ought to be known by that name. It has no relation to the true *P. nivalis,* Pallas.

Asiatic Species (neither Himalayan nor Chinese) of the Nivalis Section.

Lilac flowers.	White flowers.
P. eximia, Greene	*P. Bayernii,* Rupr.
P. longipes, Freyn et Sintenis	
P. nivalis, Pallas	
P. pumila, (Regel) Pax	
P. turkestanica, Regel	

SECTION CUNEIFOLIA.

P. cuneifolia, Ledeb., has been recorded from Amurland.

Asiatic Species (neither Himalayan nor Chinese) of the Cuneifolia Section.

P. cuneifolia, Ledeb.

SECTION SREDINSKYA.

The specific name of **P. grandis**, Trautv., describes a foliage character in this Caucasian species which is diagnosed by the form of corolla—cylindric tube with linear petals. It is an easily-grown plant by

the side of a lake and requires no attention. The drooping flowers are disappointing because the petals are so narrow their yellow colour is hardly seen. As a foliage cover the plant is useful and demands a place in all collections. Said to have been introduced at St. Petersburg in 1877.

Asiatic Species (neither Himalayan nor Chinese) of the Sredinskya Section.

Yellow flowers.

P. grandis, Trautv.

SECTION MEGASEAEFOLIA.

Why PAX places the Caucasian **P. megaseaefolia,** Boiss., in association with the Chinese plants of the CAROLINELLA section I do not understand. It seems to me, in the state of our knowledge, as isolated as is *P. grandis,* Trautv. Miss WILLMOTT brought it to Britain in 1901 and it is now a recognized favourite of the greenhouse and in some districts is grown out of doors. At Edinburgh it lives and produces a few flowers in the open, but is not happy.

Asiatic Species (neither Himalayan nor Chinese) of the Megaseaefolia Section.

Rose-coloured flowers.

P. megaseaefolia, Boiss. (fig. 83)

I have only to add the name of **P. Fedtschenkoi,** Regel, a Turkestan species not in cultivation, which has a look of the AURICULATA section, but I cannot place it with certainty.

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"AFRICAN SPECIES OF PRIMULA."

The genus Primula appears in Africa only through **P. simensis,** Hochst., upon the mountains of Abyssinia. The plant is a microform of *P. verticillata,* Forsk., of the opposite coast.

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JAPANESE SPECIES OF PRIMULA.

WE have been so long accustomed to think of Japan as a country whence Primulas come to us that it may be a surprise to many to learn that there are only eleven species of *Primula* native in Japan. Eight of them are endemic. Two of them show microforms sufficient to warrant their receiving definite names. Including the microforms there are fourteen distinct named Primulas in Japan. No one of the

species of Japan is found in China. The Primula flora of the two countries is quite different and distinct, and this is only a particular illustration of the general case. We are too much given to think of China and Japan as one area botanically and horticulturally. Kinship of degree there is between the floras as there is between the peoples of China and Japan, but the floras are not the same.

Writing as I am about the Japanese species, I wish to state that I am so fortunate as to be able to draw upon the accurate knowledge of the flora of Japan possessed by Mr. H. TAKEDA, who is now a resident in Britain. He has been so good as to write a critical account of the Primulas of Japan, to be published in the immediate future. My own limited study of Japanese forms endorses the conclusions he arrives at in his story of the species, and what I say here is based upon his work.

At the outset I give a list of the Japanese species, with their synonyms:

JAPANESE PRIMULAS WITH LIMITED SYNONYMY.

P. cortusoides, Thunb., non Linn. = **Sieboldii.**
P. cortusoides var. *amoena*, Lindl. = **Sieboldii.**
P. cortusoides var. *grandiflora*, Verschaffelt = **Sieboldii.**
P. cuneifolia, Ledeb. (Sect. CUNEIFOLIA.) Yezo, Kurile Islands. Also Tschuktschiland and Aleutian Islands.
Microforms:
P. hakusanensis, Franch. Central and Northern Japan.
P. heterodonta, Franch. Northern Hontô.
P. eximia, Greene. (Sect. NIVALIS.) Kurile Islands. Also Aleutian and Pribilof Islands.
P. farinosa var. *Faurieae*, Miyabe = **Faurieae.**
P. farinosa var. *luteofarinosa*, Franch. et Sav. = **modesta.**
P. farinosa var. *mistassinica*, Makino = **macrocarpa.**
P. farinosa subsp. *modesta*, Pax = **modesta.**
P. Faurieae, Franch. = **modesta** microform.
P. Fauriei, Pax = **Faurieae.**
P. gracilis, Stein = **Sieboldii.**
P. hakusanensis, Franch. = **cuneifolia** microform.
P. Hayaschinei, Petitm. = **macrocarpa.**
P. heterodonta, Franch. = **cuneifolia** microform.
P. hirsuta, Siebold = **kisoana.**
P. japonica, A. Gray. (Sect. CANDELABRA.) Central and Northern Hontô, Yezo. Cult. Intro. 1871 Wm. Bull.
P. jesoana, Miq., Franch. et Sav. (Sect. GERANIOIDES.) Central Japan, Yezo.
P. yedoensis, Franch. et Sav.
P. kisoana, Miq. (Sect. CORTUSOIDES.) S.-W. Japan. *P. hirsuta*, Siebold.

P. macrocarpa, Maxim. (Sect. MACROCARPA.) Mt. Hayaschine, Province of Rikuchû.

P. farinosa var. *mistassinica,* Makino.

P. Hayaschinei, Petitm.

P. Matsumurae, Petitm. = **modesta.**

P. modesta, Bisset et Moore. (Sect. FARINOSA.) From Yezo to Shikoku. Cult. Introd. 1911, R. B. G., Edin.

P. farinosa subsp. *modesta,* Pax.

P. farinosa var. *luteofarinosa,* Franch. et Sav.

P. Matsumurae, Petitm.

Microform :

P. Faurieae, Franchet. Yezo, Kurile Islands.

P. farinosa var. *Faurieae,* Miyabe.

P. Fauriei, Pax.

P. modesta var. *Faurieae,* Takeda.

P. nipponica, Yatabe. (Sect. CUNEIFOLIA.) Northern Hontô.

P. patens, Turcz. = **Sieboldii.**

P. Reinii, Franch. et Sav. (Sect. REINII.) Central Japan. Cult. Introd. about 1909 ?

P. Sieboldii, E. Morren. (Sect. CORTUSOIDES.) Hontô, Yezo, Kyûshû. Also Transbaikalia. Cult. Introd. 1861, Veitch Coll. J. G. Veitch.

P. cortusoides, Thunb. (non Linn.).

P. cortusoides var. *amoena,* Lindl.

P. cortusoides var. *grandiflora,* Verschaffelt.

P. cortusoides var. *patens,* Turcz.

P. gracilis, Stein.

P. patens, Turcz.

P. tosaensis, Yatabe. (Sect. REINII.) Shikoku.

P. veronicoides, Petitm. = **Stimpsonia chamaedryoides,** Wright.

P. yedoensis, Franch. et Sav. = **jesoana.**

It is noteworthy that these Japanese species belong to no less than eight separate sections of the genus, and I will deal with these sections successively.

SECTION CORTUSOIDES.

This section is named after the longest-known species of it—*P. cortusoides,* Linn.—but that species is not Japanese. All the Japanese plants named *P. cortusoides,* Linn., are, as Mr. TAKEDA shows, forms of *P. Sieboldii,* E. Morren. Only two Japanese species are in this section—*P. Sieboldii,* E. Morren, and *P. kisoana,* Miq. ; the latter endemic, the former extending into Transbaikalia.

Both of them have been long in cultivation in Japan ; **P. Sieboldii** only has reached Europe, and a cultivated plant of it was described by E. MORREN in 1873 under the specific name it now bears. The plant had been known to European botanists so much earlier as 1838, when TURCZANINOW gave an account of it under the designation *P. cortusoides* var. *patens,* Turcz. Of how long it had been in cultivation before

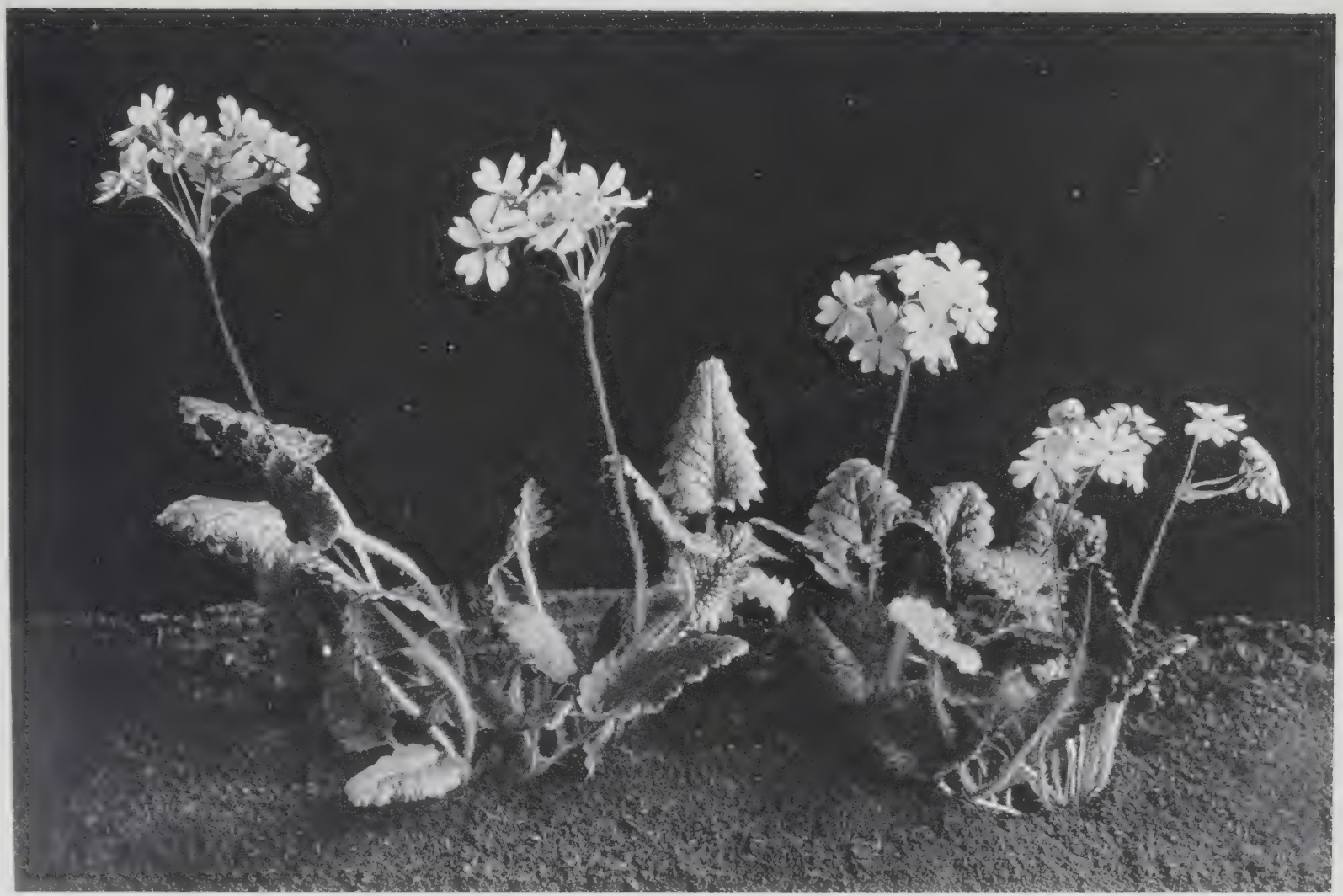

Fig. 81.—Primula Sieboldii, E. Morren. Wild form.

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FIG. 82.—PRIMULA DARIALICA, Rupr.

Fig. 83.—Primula megaseaefolia, Boiss.

Fig. 84.—Primula Reinii, Franch. et Sav.

[To face p. 177.

1873 there is no certain evidence, but the plant introduced from Japan in 1861 by Messrs. VEITCH, through their collector, Mr. J. G. VEITCH, under the name *P. cortusoides*, Linn., was this plant *P. Sieboldii*, E. Morren, and our gardens owe the plant to them. At that time and for long after—even to the present day—*P. Sieboldii*, E. Morren, issued from Japan under the name *P. cortusoides*, Linn. (See what I say about the CORTUSOIDES section on pages 140 and 176.) Of **P. kisoana,** Miq., Mr. TAKEDA tells that it has been a garden plant in Japan for over two hundred years and has flowers of a deep rose colour. We may wonder how it has happened the plant has not come to our gardens in Europe. Seeds which I collected in Japan in 1910 did not germinate. Through Mr. TAKEDA I hope this and other Japanese species may be introduced.

Japanese Primulas of the Cortusoides Section.

P. kisoana, Miq.

P. Sieboldii, E. Morren (fig. 81)

SECTION GERANIOIDES.

In this section comes **P. jesoana,** Miq., which is to be regarded as the eastern extension of the sylvestral species of western China of which I have already spoken. This Japanese species shows the characteristic leaf and flower features of the section, and is perhaps dwarfer than the Chinese forms. It is not yet in cultivation, and is not particularly attractive according to Mr. TAKEDA.

Japanese Species of the Geranioides Section.

P. jesoana, Miq.

SECTION REINII.

The section FALLACES of Pax includes four of the Japanese species, but is not, as Mr. TAKEDA shows, a natural one. Of the species included in it, *P. kisoana,* Miq., finds its allies in the CORTUSOIDES series as has been stated; *P. jesoana,* Miq., is as undoubtedly one of the GERANIOIDES; the remaining two—*P. Reinii,* Franch. et Sav., and *P. tosaensis,* Yatabe—form a distinct group with petiolate rounded leaves, small calyces, and cylindric capsules protruding far beyond the calyx. **P. Reinii,** Franch. et Sav., is now in cultivation. I do not know the history of its introduction. At Edinburgh we received it some years ago through the Yokohama Nursery Company, and possibly it is through this firm that the plant has come to Europe. It is a delightful little plant, with large flowers for its size, and seems to have no special needs in cultivation. Of its hardiness in this country I have no record. **P. tosaensis,** Yatabe, comes from a region in Japan which forbids expectation that it will be hardy in Britain if it be introduced.

Japanese Species of the Reinii Section.

P. Reinii, Franch. et Sav. (fig. 84)

P. tosaensis, Yatabe

Section Farinosa.

There are, to my thinking, only two good garden plants in the Section Farinosa—limiting that section in the way I do here: one of them our European *P. frondosa*, Janka, and the other the Japanese *P. modesta*, Bisset et Moore, of which I write. The plant commonly met with in gardens as *P. frondosa*, Janka, is certainly not open to the doubt cast upon its identity by Pax who states that true *P. frondosa*, Janka, is destitute of meal. Original types in the Herbarium of the Royal Botanic Garden, Edinburgh, contradict that statement. Its silver meal is replaced in the Japanese plant by golden meal. **P. modesta,** Bisset et Moore, is found over a considerable area in Japan and from seed I collected on Nyohozan a crop of it has been grown at Edinburgh. It is as hardy as *P. frondosa*, Janka. A xeromorph of *P. modesta*, Bisset et Moore, is the plant described by Franchet as **P. Faurieae,** Franchet.

Japanese Species of the Farinosa Section.

P. modesta, Bisset et Moore (fig. 85)
P. Faurieae, Franch.

Section Nivalis.

The only species of the Nivalis section that appears in the Japanese flora is **P. eximia,** Greene. It is a microform of *P. nivalis*, Pallas, and is a robust little plant, with flowers large for its size. It is not in cultivation, and its introduction is to be desired in the hope that it may give us an adaptable *nivalis* form. The presence of this species in the Japanese area, with its extension into the Aleutian and Pribilof Islands, is a fact of distribution of some interest. It is one of the links by which *P. nivalis*, Pallas, encircles the globe in the northern hemisphere.

Japanese Species of the Nivalis Section.

P. eximia, Greene

Ssection Cuneifolia.

The section Cuneifolia presents us in Japan with specific forms which have a strong physiognomic resemblance to species of the European Alps, but always without glands: rosette forms with obovate or obcuneate leaves more or less toothed, having a winged base, and sending up short scapes bearing umbellate trusses of lilac-purple flowers. In fruit, the capsule is enclosed in the calyx. **P. cuneifolia,** Ledeb., in its typical form and in its microforms **P. hakusanensis,** Franch., and **P. heterodonta,** Franch., is widely spread in Japan. The species is one of those that link the Primula distribution of the old world with the new, extending as it does in microforms through Tschuktschiland and into the Aleutian Islands and Alaska. Of it as a plant of cultivation I have no record, nor of **P. nipponica,** Yatabe, the other Japanese species of the section; but their bright

flowers and large flower-trusses, particularly in the microform *P. heterodonta*, Franch., suggest value.

Japanese Species of the Cuneifolia Section.

P. cuneifolia, Ledeb.
P. hakusanensis, Franch.
P. heterodonta, Franch.
P. nipponica, Yatabe

Section Macrocarpa.

The section includes species of the facies of those of the Cuneifolia section, but whilst there the capsule is included within the calyx at time of dehiscence, here it projects far beyond as a cylindric box. **P. macrocarpa**, Maxim., is the rarest of Japanese species and is endemic. It has not horticultural merit, but botanically it has interest as representative of a section which has developed in N.-W. China in forms like *P. Hemsleyi*, Petitm.

Japanese Species of the Macrocarpa Section.

P. macrocarpa, Maxim.

Section Candelabra.

Of the species included in this section **P. japonica**, A. Gray, is the only Japanese one, and it has been known longest to botanists and horticulturists alike. It became a denizen of our gardens in 1871 through the enterprise of Mr. Bull. The finest hardy Primula of its time, it still holds place in the foremost rank of cultivated forms despite the inflow of the many new species of recent years. Of its qualities which make it everyone's plant I need not speak. Both by its own variations and the readiness with which it crosses with other species it has been and continues one of the most influential factors of garden adornment.

Japanese Species of the Candelabra Section.

P. japonica, A. Gray (fig. 97)

P. Miyabeana, Ito et Kawakama, may be mentioned here as an appendage to the Japanese species. It is a purple-flowered species of the Candelabra section which grows on Mount Morrison in Formosa. It is not yet in cultivation.

* * * * * * * *

AMERICAN SPECIES OF PRIMULA.

America is not rich in species of *Primula*. Eleven specific types only—five of them endemic—are known from the continent—three of them showing more or less microforms which have names. Including the microforms there are nineteen named Primulas in America.

AMERICAN SPECIES OF PRIMULA WITH LIMITED SYNONYMY.

P. angustifolia, Torr. (Sect. NIVALIS.) Rocky Mts. of Colorado and New Mexico.
P. angustifolia var. *Helenae,* Pollard et Cockerell.

P. americana, Rydberg = **farinosa** microform.

P. angustifolia var. *Cusickiana,* A. Gray = **Cusickiana.**

P. angustifolia var. *Helenae,* Pollard et Cockerell = **angustifolia.**

P. borealis, Duby. (Sect. FARINOSA.) Alaska. Also Tschuktschiland, Kansu.
Microform :—
P. Loczii Kanitz. Alaska ; also Kansu.

P. Broadheadeae, M. E. Jones = **Parryi.**

P. CUNEIFOLIA, Ledeb. (Sect. CUNEIFOLIA), in the Microform
P. saxifragifolia, Lehmann. Alaska and Aleutian Islands ; also Tschuktschiland, Japan.
P. cuneifolia, A. Gray.
P. hyperborea, Sprengel.

P. Cusickiana, A. Gray. (Sect. NIVALIS.) East Oregon.
P. angustifolia, var. *Cusickiana,* A. Gray.

P. davurica, Spreng. = **farinosa** microform.

P. decipiens, Duby = **magellanica.**

P. egaliksensis, Hornemann = **egalliccensis.**

P. egalliccensis, Wormskiold. Labrador ; also Greenland.
P. egaliksensis, Hornemann.

P. Ellisieae, Pollard et Cockerell = **Rusbyi.**

P. eximia, Greene = **nivalis** microform.

P. farinosa, Linn. Canada, N.-E. America. Also Asia, Europe. Cult.
P. incana, M. E. Jones.
Microforms :
P. americana, Rydberg. Rocky Mts. of Montana, Wyoming, Alberta, Colorado.
P. farinosa var. *americana,* Torr.
P. Warei, Stein.
P. davurica, Spreng. Saskatchewan. Also Asia from Western Siberia and Mongolia to the Urals. Caucasus, N.-W. Russia. Cult.
P. groenlandica (Warming). Labrador. Also Greenland.
P. stricta, Lange.
P. stricta var. *groenlandica,* Warming.
P. magellanica, Lehmann. Patagonia. Cult.
P. decipiens, Duby.
P. farinosa var. *decipiens,* DC.
P. mistassinica, Michx. Newfoundland to the Rocky Mts. Cult. Introd. 1819, Goldie.
P. Macalliana, Wiegand.
P. pusilla, Goldie.
P. tenuis, Small.

FIG. 85.—PRIMULA MODESTA, Bisset et Moore

[To face p. 180.

FIG. 86.—PRIMULA SUFFRUTESCENS, A. GRAY

P. farinosa var. *americana*, Torr. = **americana.**
P. farinosa var. *decipiens*, DC. = **magellanica.**
P. groenlandica, Warming = **farinosa** microform.
P. hyperborea, Spreng. = **saxifragifolia.**
P. incana, M. E. Jones = **farinosa.**
P. integrifolia, Gunner = **sibirica** microform.
P. Loczii, Kanitz = **farinosa** microform.
P. Macalliana, Wiegand = **mistassinica.**
P. Macounii, Greene = **nivalis** microform.
P. magellanica, Lehmann = **farinosa** microform.
P. mistassinica, Michx. = **farinosa** microform.
P. mucronata, Greene = **Parryi.**
P. mucronata var. *arizonica*, Greene = **Parryi.**
P. NIVALIS, Pallas (Sect. NIVALIS), in the microforms:

P. eximia, Greene. Aleutian and Pribilof Islands; also Kurile Islands.

P. Macounii, Greene. Pribilof Islands, Unalaschka, St. Paul's Island.

P. pumila (Ledeb.), Pax. Aleutian Islands; also Tschuktschiland.

P. Parryi, A. Gray. (Sect. NIVALIS.) Rocky Mts. of Wyoming and Colorado to Nevada and Arizona. Cult. Introd. 1875, Backhouse.

P. Broadheadeae, M. E. Jones.
P. mucronata, Greene.

P. pumila (Ledeb.), Pax = **nivalis** microform.
P. pusilla, Goldie = **magellanica.**
P. Rusbyi, Greene. (Sect. CUNEIFOLIA.) Rocky Mts. of Arizona and New Mexico. Cult. Introd. 1885, Mr. Dean, of Bedfont.

P. Ellisieae, Pollard et Cockerell.
P. Serra, Small.

P. saxifragifolia, Lehmann = **cuneifolia** microform.
P. Serra, Small = **Rusbyi.**
P. SIBIRICA, Jacq. (Sect. FARINOSA), in the microform:

P. integrifolia, Gunner ex Oeder. Arctic America and Islands to Alaska. Also Arctic Europe. Cult.

P. stricta, Lange = **groenlandica.**
P. stricta var. *groenlandica*, Warming = **groenlandica.**
P. suffrutescens, A. Gray. (Sect. CUNEIFOLIA.) Sierra Nevada. Cult. Introd. 1884.
P. tenuis, Small = **magellanica.**
P. Warei, Stein = **americana.**

The species may be arranged in three sections—FARINOSA, CUNEIFOLIA, NIVALIS—but I cannot regard this as a final word upon relationships. The arrangement is only convenient for the time.

SECTION FARINOSA.

The commonest and widest-spread species is the worldwide *P. farinosa*, Linn., which in America as elsewhere shows variations upon the value of which botanical opinions diverge. The typical **P. farinosa,** Linn.; appears to be spread over Canada and North-Eastern America south of the Arctic, and it shows five microforms—**P. americana,** Rydberg, a plant of the Rocky Mountains in Montana, Alberta, and Colorado ; **P. davurica,** Spreng., of Siberia, turns up in Saskatchewan ; in Labrador there is the Asiatic form **P. groenlandica,** Warming ; **P. mistassinica,** Michx.—the *P. pusilla*, Goldie, of the "Botanical Magazine"—extends generally from Newfoundland to the Rockies ; then taking a long jump to Patagonia we find **P. magellanica,** Lehmann, which is unrepresented on the Andes. All these forms have more or less the value of *P. farinosa*, Linn.; itself as plants of horticultural interest. In the extreme north we have also of this section **P. borealis,** Duby, and its microform **P. Loczii,** Pax ; **P. integrifolia,** Gunner ex Oeder, a microform of **P. sibirica ;** and **P. egalliccensis,** Wormskiold.

American Species of the Farinosa Section.

P. americana, Rydberg
P. borealis, Duby
P. davurica, Spreng.
P. egalliccensis, Wormskiold
P. farinosa, Linn.
P. groenlandica, Warming
P. integrifolia, Gunner ex Oeder
P. Loczii, Pax
P. magellanica, Lehm.
P. mistassinica, Michx.

SECTION CUNEIFOLIA.

Of more interest from a horticultural standpoint is the representation of the CUNEIFOLIA section. **P. saxifragifolia,** Lehmann, one of the microforms of the East Asiatic and Japanese species *P. cuneifolia*, Ledeb., extends over the Aleutian Islands into Alaska. I do not know if *P. cunefolia*, Ledeb., or any of its microforms has ever been in cultivation, but its appearance in dried specimens indicates that it might be as acceptable as many of the European *hirsuta* forms with which it has some resemblance.

More important are *P. Rusbyi*, Greene, and *P. suffrutescens*, A. Gray, both of which are known in our gardens. **P. Rusbyi,** Greene, is a plant of the Rocky Mountains of Arizona and New Mexico, introduced to cultivation by Mr. DEAN, of Bedfont, in 1885, with an expression of great expectation for the future, but somehow it has not become common ; it requires apparently special conditions for cultivation. We may gather this from the description of its habitat—"rich and moist soil at comparatively low altitude." Beyond it in value as a plant of horticulture is **P. suffrutescens,** A. Gray. A rock undershrub of exposed situations, it is an easier plant to grow than *P. Rusbyi*, Greene. In a light, well-drained soil, it thrives at Edinburgh, and there is no more beautiful sight in a rock garden than this plant, with its abundant trusses of pink flowers showing

against its dark foliage. Like all sub-shrubby alpines, the branches are disposed to die off at the tip, but healthy shoots rapidly replace them. It was introduced in 1884.

American Species of the Cuneifolia Section.

P. Rusbyi, Greene
P. saxifragifolia, Lehmann
P. suffrutescens, A. Gray (fig. 86)

Section Nivalis.

All the other species of American Primulas are placed in the widely spread section Nivalis. *P. nivalis,* Pallas, itself does not occur, but in the subarctic and arctic area it is represented by its dwarf microform **P. pumila,** Pax, and that is really the only form of it on the American continent. In **P. eximia,** Greene, the type is represented in the Aleutian and Pribilof Islands and this form extends also into Japan. Thus in this section as well as in the Cuneifolia section we have a remarkable geographical connexion of the Primulas of America with those of Asia. **P. Macounii,** Greene, confined to St. Paul—one of the Pribilof Islands—is hardly separable from *P. eximia,* Greene. On the south-eastern area of the Rocky Mountains two species—**P. Cusickiana,** A. Gray, and **P. angustifolia,** Torr.—are found. Possibly they do not belong to the Nivalis section at all. They are rare species and are not in cultivation. But in this Nivalis section the glory of all the North American species of Primula is found—**P. Parryi,** A. Gray. It is a noble plant, which, like all the Nivalis forms, is difficult to keep. Its habitat is a wet one. It grows along the margins of alpine brooks near the snow-line through the higher rocky mountains from Colorado through Nevada and Arizona. It was introduced so long ago as 1875 by Messrs. Backhouse, of York, and under its figure in the "Botanical Magazine" for 1875 is described as the handsomest Primula ever introduced, with the exception of *P. japonica,* A. Gray. I could wish it were as easily grown as *P. japonica,* A. Gray. The difficulty seems to be to keep the requisite amount of moisture about the roots without stagnation. At Edinburgh it has not grown well, and we have only seen there a suggestion of what it should be.

American Species of the Nivalis Section.

P. angustifolia, Torr
P. Cusickiana, A. Gray
P. eximia, Greene
P. Macounii, Greene
P. Parryi, A. Gray
P. pumila, (Ledeb.) Pax

In the photographs used in illustration of this story I am indebted to Mr. Robert Edam, the skilful artist on my staff. All the plants represented flower in the Royal Botanic Gardens. To the Director and staff at Kew I owe thanks for special assistance in the preparation of dates of introduction of species, and Sir Harry Veitch has been so good as to supply me with information regarding the share of his firm in bringing in new species.

Discussion.

Mr. Elwes: To me this has been by far the most interesting lecture I have heard in this room, and I think the members will agree with me that it has been one of the best illustrated. We have to thank Professor Balfour for having brought before us such an immense number of new and interesting plants. There were one or two plants which interested me specially, because forty years ago, when working out the distribution of Asiatic birds, I made the same remark as he has made to-day, and it has been confirmed by other explorers, that is, the extraordinarily near relationship between the Alpine birds of China—and it applies also to plants—and those of the Himalayas. By Alpine I mean the high level. It is remarkable how even in Formosa you find that the birds and plants are precisely the same as those that are perfectly familiar in the Himalayas; and I venture to think that if anyone undertakes the monographing of these Chinese plants they will have to include the Himalayan, because they cannot work on one without the other. I should like to hear Professor Balfour's opinion as to this. He has also spoken about the question of cultivation, and he gave us the very interesting information that he is about to put up an Alpine House at Edinburgh. That will undoubtedly give him opportunities of growing many plants which, if we succeeded in keeping them alive for a year or two in the past, we thought we were doing wonders with. I should also like to ask him if it might not be possible by some means to get rid of the overwhelming difficulty we in the South had to contend with of alternate cold and heat. Would it not be possible to use a refrigerator? because after having been in the Alps, the high mountains of America, the Himalayas and other mountains, I feel that the main difficulty we have to deal with is the activity of plants in the winter. We cannot keep them at rest in the winter. In their own country they were for three, four, or five months above the snow, and for the rest of the year they were under the snow; and when we see what extraordinary results have been obtained by treating plants and bulbs by cold, I do not see why something should not be attempted in the cultivation of high Alpine plants in the same way. Then Professor Balfour suggested that watering from below was the best means of dealing with the liability to damp off. Of course, unless one can get information as to the locality the plants come off, we can only follow the usual gardener's rule-of-thumb method. I can speak from personal experience when I say that many of these high Himalayan plants, and those in West or North-West Yunnan, are growing in mist or in a bath of rain. The explanation given about that region leads me to suppose that the climates of the high Alps of Western China are very similar, but there are deep river valleys which are exceedingly arid. I make these remarks with a view of asking Professor Balfour whether he has found in cultivation —in which he has been more successful than anyone else—that the

FIG. 87.—PRIMULA MOLLIS, Watt

[To face p. 184.

FIG. 88.—PRIMULA GERANIIFOLIA, Hook fil. $\frac{7}{10}$ size.

Fig. 89.—Primula Winteri, Gill

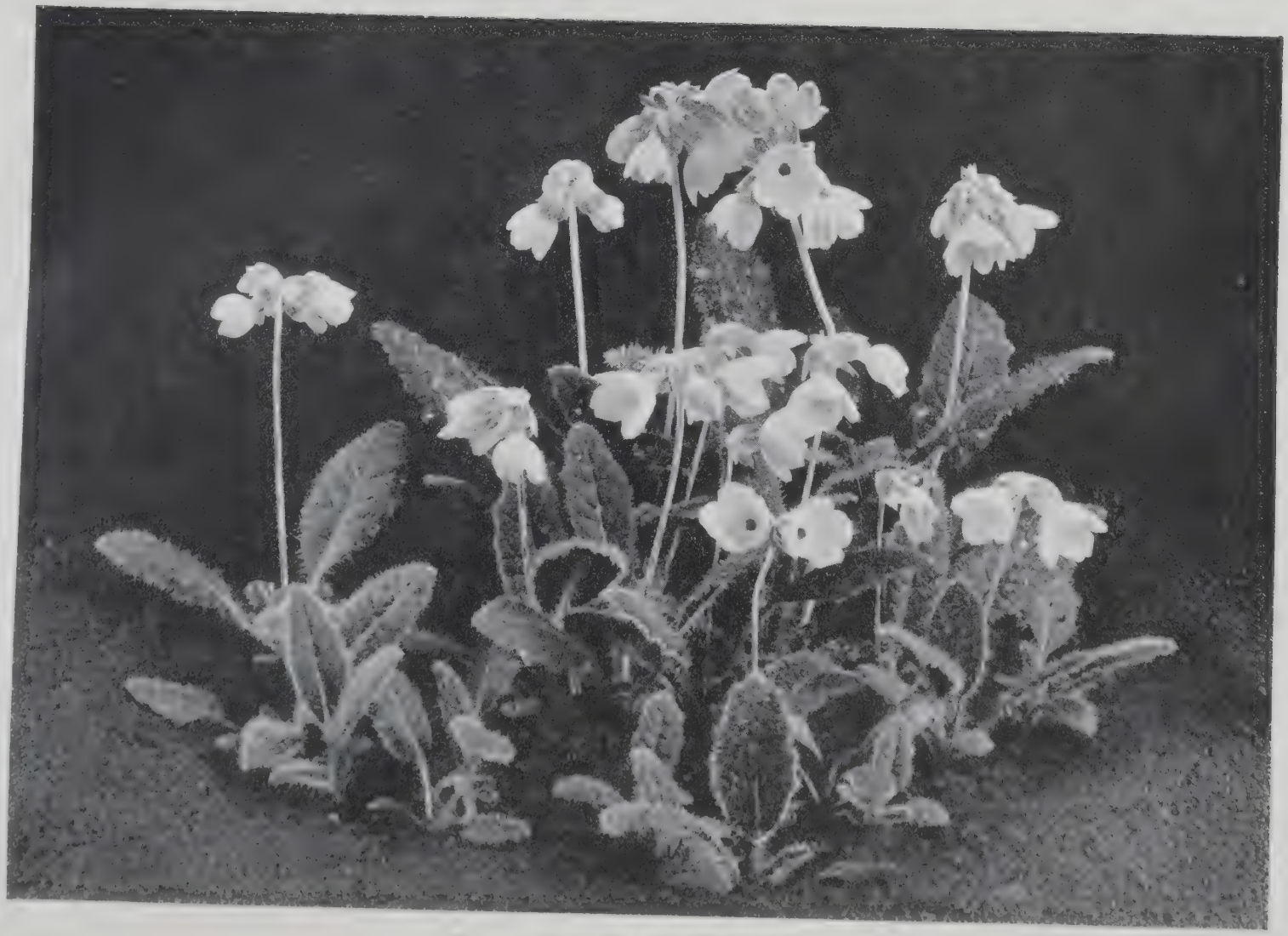

FIG. 90.—PRIMULA REIDII, Duthie

knowledge obtained from the collector has been of distinct advantage to him or not.

Professor BALFOUR: The question was answered in my Masters lecture last year, in which was pointed out the importance of having information as to the conditions. I always have pointed to the importance of the collector giving the actual habitat, and not merely the altitude.

Mr. ELWES: Whether, for instance, it is marshy or what not?

Professor BALFOUR: I want the actual habitat, whether amongst rock, amongst stone, or so on. If a collector will give us that information it will be of some use. That is where Mr. FORREST excels; he gives us a lot of detail of the exact habitat, and you can correlate it. A collector who merely says he got it at 10,000 ft. gives no information of any value, because you can have two plants growing at the same altitude but under entirely different conditions. Mere altitude or latitude is of very little use unless the collector goes further and gives us the details of the habitat.

Mr. ELWES: May I ask another question? I understood you to suggest that many of these plants were biennial.

Professor BALFOUR: Only *P. spicata* that I know of.

The PRESIDENT: I think none of them is really biennial, but it would be better to treat them as if they were biennial. We have had a very interesting lecture, and most pertinent, admirable questions asked upon it. I will now ask for Mr. CRAIB's paper.*

"NOTES ON HIMALAYAN PRIMULAS."

Mr. W. G. CRAIB, M.A.: Just over a year after Sir GEORGE WATT delivered his paper † on Indian Primulas there appeared in ENGLER's "Pflanzenreich" a monograph of the family Primulaceae by PAX and KNUTH.‡ This monograph in its treatment of the Indian species differs to a considerable extent in its grouping of the species from the arrangement adopted by Sir GEORGE WATT as also from that proposed in the "Flora of British India." In the limitation of the species there are also considerable differences. Although in many points the monograph, so far as the Indian species are concerned, is a decided advance on the earlier works, the writer must point out that it is by no means final, for much remains to be done before our knowledge of them can be said to be nearly complete.

The object of the present paper is to give an indication of the work done since Sir GEORGE WATT'S contributions, and that purpose will probably be best served by taking the sections of the genus in the sequence proposed by PAX and KNUTH and adding any remarks on the differences (as regards limitation of species &c.) between their views and those of Sir GEORGE WATT, and on any points in which

* This, in the absence of the author, was read in title by the Rev. W. Wilks.

† See p. 196. ‡ See p. 219.

the writer may not agree with either. In adopting the sections proposed in that monograph the writer must not be held as approving of that arrangement in all respects, for he feels quite convinced that the grouping might be considerably improved in not a few cases had one the necessary time to devote to it.

In the section SINENSES there are enumerated six Indian species : *P. filipes*, *P. Listeri*, *P. mollis* (fig. 87), *P. geraniifolia* (fig. 88), and *P. vaginata* the East Himalaya, and *P. Clarkei* from Kashmir—all of which are from included in WATT's section PETIOLARIS. The Eastern plants, with the probable exception of *P. Listeri*, would appear to be rather local and rare. *P. filipes* is still represented by the unique type-sheet only, and *P. mollis*, though well known in cultivation, had not been collected since BOOTH's time until 1905, when J. C. WHITE, then Political Officer in Sikkim, found it in the Bhutan highlands. Comparatively recently, *P. obconica*—or it may be a species very closely allied to it—has been found in Upper Burma, this being the first record of its occurrence in India. Before leaving this section it may be pointed out that PAX and KNUTH denote as having been seen by them a specimen of *Cortusa Matthioli* from Sikkim. This statement is probably based on a fruiting specimen of *P. geraniifolia* collected in Sikkim by HOOKER and distributed by him as a *Cortusa*.

The section FLORIBUNDAE, Pax, includes the same two Indian species as WATT's section FLORIBUNDA : *P. floribunda* and *P. Lacei*.

In the section PETIOLARES, Pax—which is used in a much more restricted sense than WATT's section of the same name—there are included four Indian species : *P. petiolaris*, *P. Edgeworthii*, *P. Hookeri*, and *P. Tanneri*. In his treatment of *P. petiolaris* WATT agrees with that adopted in the " Flora of British India," with the single exception that he retains *P. nana* as a distinct species. PAX and KNUTH, on the other hand, accept all the varieties of the " Flora of British India " except *Edgeworthii*, which PAX regards as a distinct species. Since these revisions the variety *pulverulenta* has been brought into cultivation and is known as a distinct species under the name *P. Winteri* (fig. 89). This plant has been exhibited several times at the Royal Horticultural Society's meetings, and is so well known in horticultural circles that it is necessary here to point out only that *P. Winteri* is synonymous with *P. petiolaris* var. *pulverulenta*, Hook. f. In the writer's opinion *P. Edgeworthii* and *P. Winteri* are quite good, valid species, and should not be regarded as varieties of *P. petiolaris*. But quite as distinct as the two just mentioned are the varieties *sulphurea*, Hook. f. and *Stracheyi*, Hook. f., which the writer would regard as distinct species. The former, which he would name *P. sulphurea*, is readily distinguished from *P. Winteri* by the smaller flowers and leaves and by the colour of the farina (from which the name was derived). Unfortunately the name *Stracheyi* is already occupied in the genus, so for the latter the writer proposes the name *P. Drummondiana*, in compliment to Mr. J. R. DRUMMOND, who by placing his copious material

FIG. 91.—PRIMULA UNIFLORA, Watt

FIG. 92.—PRIMULA EROSA, Wall. $\frac{1}{2}$ size.

of *Primula* at the writer's disposal as well as by his advice on various critical points has greatly assisted the writer in his present task. *P. Drummondiana* is easily distinguished from *P. Winteri* by the smaller flowers and by the corolla lobes being bilobed and not at all fringed. The remaining varieties—namely, *nana* and *scapigera*—the writer is at present inclined to retain, although it must be pointed out that in the former variety some rather distinct plants are included. The writer is in full accord with Sir GEORGE WATT in his remark that *P. petiolaris* and its varieties are well worthy the attention of horticulturists; and now that *P. Winteri* is so much appreciated he hopes to see more of the allied species imported soon, for it appears quite evident that from living material only can *P. petiolaris* and its varieties, *nana* and *scapigera*, be satisfactorily accounted for.

With regard to *P. Tanneri*, PAX and KNUTH do not indicate any specimens as having been seen by them, and so have, according to the writer's views, separated it widely from its ally *P. Griffithii*.

The section SOLDANELLOIDEAE, Pax, corresponds with the section SOLDANELLOIDES, Watt, with the addition of *P. pusilla* and *P. sapphirina*, which WATT placed in his section DENTICULATA. In addition to the two mentioned it includes *P. Wattii* (fig. 94), *P. Reidii* (fig. 90), *P. uniflora* (fig. 91), and *P. soldanelloides*.

So far as the Indian species are concerned PAX's section FARINOSAE corresponds to the section ROSEA, Watt, except that PAX refers *P. hazarica* to the CALLIANTHEAE. To this section also belongs a new species collected during the Tibet Frontier Commission expedition which the writer would name *P. Walshii* in compliment to the collector. In habit the plant is very similar to *P. pumilio*, Maxim., from Kansu, but it is readily distinguished by the abundance of glandular hairs.

The section CAPITATAE, Pax, which includes several well-marked types, contains five species which WATT referred to his section DENTICU- namely, *P. erosa* (fig. 92), *P. denticulata* (fig. 59), *P. glabra* (fig. 93), *P. bellidifolia*, and *P. capitata*, and two new species described by PAX: *P. Schlagintweitiana* and *P. glomerata*. These two species the writer has not seen, but from description plants collected by DUTHIE in Kumaon would appear to belong to the former, and they agree fairly well with the figure given except that the pedicels are much shorter; but, whereas from the figure the pedicels would appear to be up to 6 mm. long, PAX in his description says "pedicelli fere nulli." The plant is closely allied to *P. denticulata*, from which it may best be distinguished by the absence of basal scales. From description *P. glomerata* would appear to be well represented in Kew herbarium. A close ally of *P. glomerata*—or it may be a hybrid—is the plant figured under the erroneous name of *P. erosa* in the "Botanical Magazine." In 1911 another species belonging to this group was published by W. W. SMITH under the name *P. atrodentata*. Founded on specimens collected in Zemu and Llonakh, Sikkim, it may be regarded as the Eastern representative of *P. Schlagintweitiana*. The plant was previously collected at Lachen by Sir J. D. HOOKER, but the material of that collection was too poor for description. Under the

name *P. capitata*—which appears to be a connecting link between the true *denticulata* and the *bellidifolia* series—there appear to the writer to be three distinct plants—namely: (1) the true *capitata* with rather short and narrow, acute leaves, white on the under-surface exactly as represented in the original "Botanical Magazine" plate; (2) a much more robust plant with large leaves, generally rounded at the apex, very rarely white on the under-surface, with a deeper and more coarsely cut edge and with the nerves prominent on the under-surface; and (3) a plant mixed on two sheets in the herbarium with leaves intermediate in size but with yellow farina on the under-surface. These three plants the writer believes to be specifically distinct.

Three Indian species—namely, *P. Heydei*, *P. minutissima*, and *P. reptans*—form the section MINUTISSIMAE, Pax. Of these, the only plant calling for special notice here is *P. minutissima* var. *spathulata*, Hook. f., which the writer regards as a distinct species. Unfortunately, the name *spathulata* has already been applied to a species, and under these circumstances the writer proposes the name *P. spathulifolia* for it. In 1911, W. W. SMITH described a new species under the name *P. flagellaris*, which in foliage is very similar to *P. spathulifolia*; but which is very distinct from it, as from all other Indian species, in possessing long runners which terminate in small plants after the fashion of some of the flagellate Saxifrages.

Of the seven species comprising the section TENELLAE, Pax, there are four East Himalayan: *P. tenella*, *P. muscoides*, *P. tenuiloba*, and *P. Stirtoniana*. PAX's treatment of these differs only in the raising of *P. muscoides* var. *tenuiloba* to specific rank.

The NIVALES include four Indian species: *P. sikkimensis*, *P. Stuartii*, *P. elongata*, and *P. nivalis*. The first named is, so far as the writer has seen, confined to the East Himalaya. In his treatment of *P. Stuartii*, PAX rightly strips it of the numerous varieties accorded to it in WATT's and HOOKER's systems and attaches these varieties to *P. nivalis*; but as to how distinct these varieties—namely, *Moorcroftiana*, *macrophylla* (i.e. *P. purpurea*, Royle), and *macrocarpa*—may be amongst themselves the writer does not feel quite satisfied from the dried specimens. Shortly after the publication of the monograph, PAX described a new species under the name *P. Mecboldii* which, though PAX in his description refers it to the next section, the writer cannot separate specifically from *P. nivalis* var. *Moorcroftiana*. In his notes on the flora of South-East Sikkim in early July, W. W. SMITH remarks that the Primulas were a special glory of the slopes and meadows, and that the most conspicuous was a white *P. Stuartii* with a somewhat oblique corolla. In his paper, SMITH hints that it may be a new species, and this has proved to be the case. He hopes to publish it soon under the name *P. obliqua*. It was previously collected at Laghep by C. B. CLARKE.

Among the CALLIANTHAE, which is probably the least natural of PAX's sections, are enumerated eight species from India: *P. Dickieana*, *P. Pantlingii*, *P. Jaffreyana*, *P. hazarica*, *P. Inayatii*, *P. Griffithii*,

P. Kingii, and *P. obtusifolia*. Of these the only new species is *P. Griffithii*, which is synonymous with *P. obtusifolia* var. *Griffithii*, Watt. As previously pointed out, this species in PAX's classification is widely separated from *P. Tanneri* to which it is undoubtedly closely allied. From the copious material collected in Sikkim by W. W. SMITH and G. H. CAVE it is quite evident that *P. Pantlingii* is at most only a form of *P. Dickieana*. The species occurs locally in wet West Sikkim, and is somewhat variable in the number of flowers (2–6) and in its range of colour (whitish-yellow, yellow, mauve or purple). A short time ago, I saw a plant of *P. Inayatii* which was under cultivation in Glasnevin. At first, I was somewhat sceptical as to its being this species owing to the absence of the hairs on peduncle and pedicels as described by the author. On examination of the co-types in the Kew herbarium it was found, however, that these so-called hairs were of fungoid origin. From his recent Sikkim collections, W. W. SMITH has described a new species—*P. Caveana*—which is closely allied to *P. Jaffreyana* from which it may best be distinguished by the non-ribbed calyx. *P. obtusifolia* would appear to be a much rarer plant than one would suppose from the distribution quoted by PAX and KNUTH. The Eastern plant referred by them to this species is probably the *P. Gammieana*, King, which WATT has already accounted for.

The constituents of the CORDIFOLIAE are *P. reticulata*, *P. Gambeliana* (fig. 95), *P. pulchra*, and *P. cordifolia*. The last named, which is unknown to the writer, was described by PAX in 1889 from a plant collected between Tongloo and Phalut by SCHLAGINTWEIT. Allied to *P. reticulata* is a Chumbi plant which the writer has not seen and which will be published shortly as *P. chumbiensis*, W. W. Smith.

In the section CANKRIENIA there is enumerated but one Indian species—*P. prolifera*—whose distribution is given as East Himalaya and Assam. The Assam plant agrees well with WALLICH's original description, but the Chumbi plant, although undoubtedly closely allied, is quite distinct, the best distinguishing points being found in the presence of farina and in the shape of the calyx lobes. This Chumbi plant I propose to call *P. Smithiana* in compliment to Mr. W. W. SMITH, M.A., Assistant Keeper of the Royal Botanic Gardens, Edinburgh, who, during his tenure of the post of Curator of the Herbarium attached to the Royal Botanic Gardens, Calcutta, paid particular attention to the Sikkim Primulas during several tours of that district. To this section also belongs *P. Whitei*, W. W. Smith, recently described from specimens collected in Bhutan by WHITE. Its nearest ally is *P. sonchifolia* of Yunnan, for which, at a casual glance, it might easily be mistaken.

Another Bhutan Primula yet remains for which the writer can find no satisfactory position among PAX's sections: *P. Jonarduni*, W. W. Smith. A small tufted perennial plant with small densely imbricate and markedly coriaceous leaves which are farinose below, it represents a type not found before in India.

Descriptions of New Himalayan Primulas.

Primula Walshii, *Craib*, sp. n., a *P. pumilio*, Maxim., cui affinis, foliis calyceque pilis glanduliferis instructis recedit.

Herba pumila, 10–15 mm. alta, dense foliata. *Folia* oblanceolata vel oblongo-oblanceolata, apice acuta vel obtusa, basi cuneata, circiter 6 mm. longa et 2–3 mm. lata, subrigida, juventute praecipue pilis brevibus glanduliferis pagina superiore instructa, nervis subconspicuis, petiolo brevi inferne ampliato suffulta. *Flores* folia parum superantes, pedunculo communi paucifloro circiter 2 mm. longo suffulti ; bracteae involucrantes circiter 2 mm. longae, pedicellis parum longiores, pedicellis bracteis calyceque extra pilis brevibus glanduliferis albidis tectis. *Calyx* 3·5 mm. longus, lobis tubo parum brevioribus. *Corolla* calycem circiter 1 mm. excedens, lobis 2·5 mm. longis 3 mm. latis altius bifidis.

Phari plain and the Upper Chumbi Valley on the way to Phari. *Walsh*, 141 ! (Herb. Kew).

Primula Smithiana, *Craib*, sp. n., *P. proliferae*, Wall., peraffinis, sed calyce farinoso eiusque loborum forma differt.

Folia oblongo-oblanceolata vel rarius oblanceolata, apice rotundata, basi in petiolum plus minusve distinctum alatum attenuata, ad 13 cm. longa et 3·5 cm. lata, tenuiter chartacea, nervis lateralibus utrinque numerosis plerumque subpatulis, glabra vel subglabra, denticulata. *Scapus* ad 56 cm. altus, glaber, umbellam solitariam vel umbellas duas superpositas gerens ; bracteae involucrales pedicellis circiter dimidio breviores ; pedicelli graciles, ad 1 cm. longi. *Calycis* extra farinosi tubus 3·5 mm. longus, 3·5 mm. diametro ; lobi brevissimi, latissime deltoidei. *Corollae* tubus 9 mm. longus, fauce annulatus ; lobi cordati, 7 mm. longi, 6·5 mm. lati. *Ovarium* 2 mm. altum, 2 mm. diametro ; stylus 7·5 mm. longus, apicem versus minute puberulus, stigmate grandiusculo.

Chumbi, *Dungboo* ! *Dungboo*, 493 ! *Walsh*, 157 ! Yatung, *Hobson* ! (Herb. Kew).

Primula sulphurea, *Craib*, sp. n., ab affini *P. Winteri*, W. Watson, foliis floribusque conspicue minoribus, foliis pagina inferiore farina sulphurea obtectis recedit.—*P. petiolaris*, Wall., var. *sulphurea*, Hook. f. Fl. Brit. Ind., vol. iii. p. 493.

Kumaon, Suring, 1350 m., *Strachey & Winterbottom* ! (Herb. Kew).

Primula Drummondiana, *Craib*, sp. n., a *P. Winteri*, W. Watson, cui affinis, corolla minore eiusque lobis bilobatis distinguenda.—*P. petiolaris*, Wall., var. *Stracheyi*, Hook. Fl. Brit. Ind., vol. iii. p. 493.

Kumaon, Namil, 2400 m., *Strachey & Winterbottom* ! (Herb. Kew).

Primula spahulifolia, *Craib*, sp. n., a *P. minutissima*, Jacquem., foliis floribusque majoribus recedit.—*P. minutissima*, Jacquem., var. *spathulata*, Hook. f. Fl. Brit. Ind., vol. iii. p. 494.

Sikkim, 3900 m. *J. D. Hooker* ! (Herb. Kew).

The PRESIDENT then asked Mr. WILKS to read Miss G. Jekyll's paper on

"PRIMULAS FROM A GARDEN POINT OF VIEW."

Miss GERTRUDE JEKYLL, V.M.H.: When we consider the main uses of our garden Primroses we find that they fall into three groups, namely those for borders, those for the rock garden, and those for boggy ground. The border kinds alone need a further sub-division, suggesting distinct ways of use, for there are what we call the true Primroses, namely those that are all on single stalks; there are the polyanthus or bunch Primroses; then the old florists' Polyanthus, the double Primroses, and the border Auriculas. They all agree in preferring a soil of light loamy character with some leaf-mould, and a place where they are never dried up, and where they can have either slight shade or at least a non-sunny exposure.

The native Primrose of our woods, one of the most charming of flowers, is no doubt the origin of the coloured Primroses. If one might have a perfect place for them it would be a partial clearing in just such a region as the natural haunts of the wild plant—a wood of Oaks with an undergrowth of Hazel, such as occurs in nearly every farm and private property throughout the land, and not infrequently adjoins the garden. A path slightly depressed, leaving irregular, shallow banks on either side and passing through the wood in easy sweeping lines, would provide the best possible way of growing and enjoying the Primroses; for though they are also indispensable in the actual garden, they are rather more rightly placed in the setting of woodland. It will be all the better if the plants of the main sub-divisions are kept quite distinct, either by following one another along the length of the path or by having a separate little path for each kind. This is the more desirable because the varieties are so easily mixed by chance pollination by bees. Indeed, where the Giant Cowslips are grown their influence is so strong that they must be kept quite away from the bunch Primroses, and can hardly be admitted in the same garden.

The earliest to bloom will be the true Primroses. Even these, if the best effect is desired, must have some kind of division in colour-grouping; for they vary from palest pink to richest crimson, and from faintest lilac to deepest purple, thus at once suggesting two distinct colour-groups. And there will be found a third group of warm colouring, of which the strongest are of a red approaching scarlet, which will agree with neither of the others and must be treated by itself. It was from a purple primrose with a colour inclining to violet that Mr. G. F. WILSON raised his celebrated blue varieties. These again must be kept distinct from the rest, but they group charmingly with the very useful early-blooming white, seed of which can be found in the trade lists.

In these days when good hardy flowers are so much prized and

so well used, it is difficult to account for the general neglect of the fine old double Primroses. They should be in every garden, except those on light soils, for in these they do not flourish. In any soil of a loamy nature the double lilac, white, and pale yellow, will grow freely and are among the best of spring flowers. The crimson and some other shades are a little more exacting but are well worth trying. The equal neglect of the old florists' polyanthus is more easy to understand, for, though it has much charm, it is rather a thing to look at in the hand than of value as a conspicuous plant for the garden ; still, without considering the show points of special marking and lacing of edges, a free-growing strain of these might well be among our early flowers, and, planted rather closely and fully set with bloom, would have an effect of richness that would be of marked value among the flowers of spring.

Following the true Primrose in time of blooming are the large bunch Primroses, and of these, though there are also fine things among the pink and red colourings, the best for garden effect are the whites and yellows. Carefully grown strains, the result of nearly a lifetime of watchful selection, have produced beautiful flowers of large size and handsome habit. Stalks a foot long and individual blooms two inches across are by no means uncommon, and yet there is nothing of coarse appearance about the flower. Among the whites and yellows alone there is an extraordinary variety of detail, which, while it is not apparent in the mass, makes the plants extremely interesting as individuals ; hardly any two that may be seen near together have the same physiognomy. The disparity is mainly in the form and disposition of the petals, for some are smooth-edged and others largely or finely notched ; some stand clear while others are imbricated ; some are flat and others waved. The old florists' distinction of pin-eye and thrum-eye also alters the character of the flower, for though it is not noticeable or of any importance when the plants are seen in the mass, yet, when the individual bloom is observed, the single flower and the whole truss gain by the thrum-eye, where the anthers rise above the pistil and form a symmetrical centre, and especially when this is further enhanced by a raised, fretted ridge at the edge of the tube, forming a kind of crown and giving the flower what is called a rose-eye. In the pin-eye the pistil rises above the anthers and shows alone, and the more ornamental detail is wanting.

In a woody garden where some thousands of these bunch Primroses are grown the effect is extremely striking. The yellows have developed to a tint of the deepest orange, which gives great richness to the mass of full yellow colouring and additional value by contrast to the tenderer tones of pale yellow and white that are seen in the more distant stretches of the garden.

At the time of fullest bloom the best are marked for seed, and every year some thousands of seedlings are raised ; one portion of the garden being given to the divided plants and another to the seedlings. In the case of a good loamy soil the seed may be sown at once, but in lighter

FIG. 93.—PRIMULA GLABRA, Klatt

[*To face p.* 192.

Fig. 94.—Primula Wattii, King

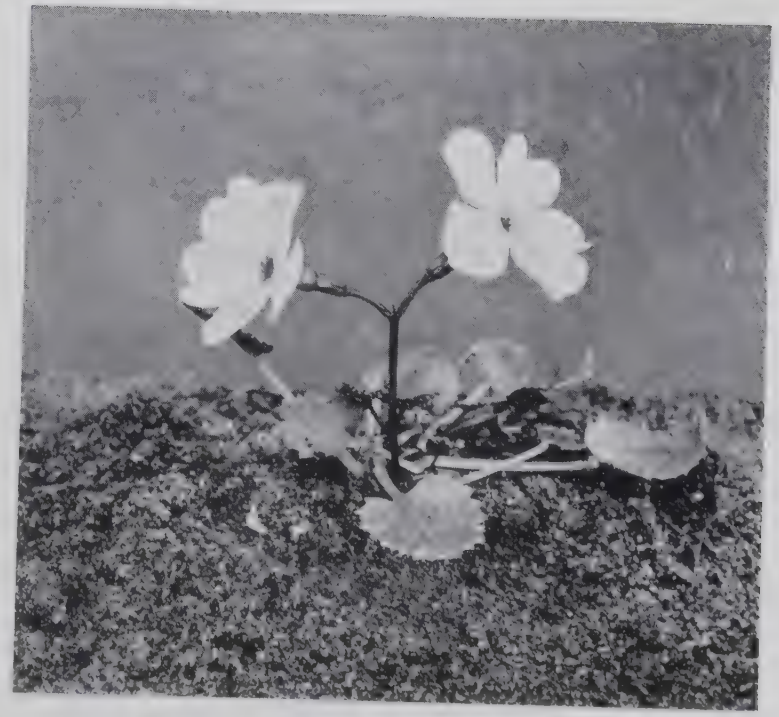

Fig. 95.—Primula Gambeliana, Wall

[*Photo : T. Stevenson.*

FIG. 96.—PRIMULA JAPONICA IN THE GARDEN AT SUTTON PLACE, SURREY

FIG. 97.—PRIMULA JAPONICA AT WISLEY [*Photo: T. Stevenson*

[*To face p. 193.*

soils it is found better not to sow till spring. In stronger soils the plants may also stand two years if it is desired, though it is generally safer to divide yearly.

Border Auriculas enjoy a rather stiffer soil, and especially one that contains chalk. They are derived from natives of the Alps and are in beautiful ranges of colouring of purple, crimson and yellow. The border varieties are commonly called Alpine Auriculas to distinguish them from the show kinds, though the name is ambiguous and even misleading, as there are several Primula species of the Auricula class, natives of the Alps, that are grown in rock gardens. The most showy and easily grown of the border Auriculas are some very large forms having yellow and brown-bronze flowers with a white eye that have been raised in Scotland.

The second group of Primulas for popular use—namely, those best suited for rock gardens—will partly overlap the first, for all the border Auriculas will be in place in the lower rocky regions, while the best of the true Alpine species, with their white varieties and a number of natural hybrids, will find places in other cool rocky clefts and hollows. The prettiest of these will be among *Primula Allionii*, *P. glutinosa*, *P. hirsuta*, *P. integrifolia*, *P. marginata*, *P. minima*, and *P. viscosa*; the planter bearing in mind that some of these belong to the calcareous and some to the granitic regions. Thus *P. Auricula*, *P. integrifolia*, and *P. minima* will be thankful for lime in any form, for preference, limestone rock; while *P. hirsuta*, *P. marginata*, *P. glutinosa*, and *P. viscosa* will flourish in sandy peat with granitic rock or sandstone.

The Primulas that, from the garden point of view, it is convenient to put in the third division are those that may be regarded as bog plants. These will include the pretty little *P. farinosa* of our own northern moors and of Alpine marshland, three Himalayan species, and one from Japan. The Himalayan are *P. involucrata*, a beautiful little Primula, quite easy to grow and strangely neglected; the early-blooming *P. rosea*, with buds of brilliant crimson followed by the full bloom of rosy pink, and *P. sikkimensis*. This, when well grown in a fairly large mass rising from black boggy ground, and seen in shade, is a wonderful picture of plant-beauty; the full heads of hanging sulphur bells having that curiously luminous quality that is only observed in this and one or two other flowers of this rare colouring. Lastly, of the well-known bog Primulas there is *P. japonica*. The type colour is a rather rank magenta red, of a quality that does not please a critical colour-eye, but there is a good white variety and many intermediate shades of pleasing pink.

It is still well grown at Wisley (fig. 97), but it was a wonderful sight to see it for the first time some thirty or more years ago, when it was comparatively a new garden plant, as grown by the late Mr. E. H. Wilson, by the side of a shallow peaty ditch in shade in the lower ground. It showed a fine plant in great quantity, so placed that it could develop to the utmost its capacity for the display of beauty and the evidence of well-being. It was one of the many good lessons taught

by Mr. Wilson that one is thankful to remember and glad to acknowledge.

Discussion and Conclusion of Conference.

The Chairman: It is my pleasure and privilege now to move a hearty vote of thanks to those who have contributed papers. I am sure that such a vote will be accorded a warm acquiescence from all here. It will go from our hearts, and I am only sorry some of the speakers have been obliged to leave and have not remained until the time arrived for the reception of this approval from you. It will, as I say, come from our hearts, and I shall have pleasure in moving it. I should like to add that I think this Conference will certainly leave a very pleasant reminiscence in our minds, and that we have every reason to believe it will bring a great accession to the ranks of our lovers of spring flowers to admire the beauties that the Almighty and His beautiful Nature have placed before us. I also hope that the Conference will have another result. I think what we want in the Horticultural world as much as anything is a good Monograph of the Primulas. If that could be prepared and illustrated by the new process of colour photography it would be acceptable to a large number of admirers of that plant. It is my great pleasure to move a hearty vote of thanks to the speakers and readers of papers.

Mr. Wallace: I have great pleasure in seconding the resolution. I should like also to say what a great pleasure it was to listen to Professor Balfour and to see the illustrations he gave us of the new Primulas. He was followed by an interesting paper by Miss Jekyll, which described the use of one or two Primulas. In connexion with *P. japonica* and the use which can be made of it in positions such as she alluded to, especially in woodland, one may note the wonderful effect to be obtained. Nowhere is it better appreciated than in open woodlands. *P. pulverulenta* is also particularly useful in this way: that wonderful plant, the name of which she did not mention, which has already given proof of new colouring, as Messrs. Veitch showed at Chelsea last year, a white form and one almost pink. This pink colouring, with waves of bold silver yellow associated with the darker reds of the japonicas, gives a scheme of colouring of extreme value and enables us to get patches of great beauty when used with a free hand. We know they grow freely from seed, and that there is no difficulty in raising them by thousands, so that we can deal with them in an effective manner, as Miss Jekyll has pointed out. The paper of Miss Jekyll provides the complement to that of Professor Balfour, as Professor Balfour showed us the plants as we have them from Nature, and she suggests the proper way to use them in our gardens.

Mr. Jenkins: May I just add a word? Miss Jekyll referred to the exacting nature of the double crimson primrose. It is true, but I think if we treated it liberally, gave it more moisture, we should be much more successful with it. Some years ago I

experimented with the old double crimson variety by planting it in a low situation and watering it freely almost every evening with liquid manure. I never saw such remarkable foliage and flowers as I obtained, and if we can only treat them in low situations, which are damp, and give them constant moisture overhead, we should be far more successful than we are. We are not sufficiently generous with them, if I may use the term, but if we give them more liberal overhead moisture—it is specially true with regard to that particular plant—we should do much better. As to the deciduous species, these we can use as freely as we like. It is the evergreen species with which we find very much difficulty. They collect moisture and retain it to their own destruction. We miss the snow covering, and the alternations of atmosphere and climate to which Mr. ELWES referred are some of the difficulties we have to overcome. I am sure that if Mr. ELWES' suggestion could be carried out, with regard to refrigerating or cooling the atmosphere in the house now about to be erected in Edinburgh, we should be very much more successful than we are at present.

The resolution was carried unanimously.

Mr. WILKS: I think before we separate we ought also to pass a very hearty vote of thanks to the Chairman for coming up from Wales and taking the chair to-day. Of course we all know he is intensely interested in Primulas, and people will always go a very long distance out of their way to get a sight of anything they are interested in. At the same time I am quite sure it was not simply that which brought him all the way up from Wales to be amongst us to-day, but it was the feeling that as an authority upon Primulas he would be able to fill the chair and to give you some enjoyment from his own experience. He has done so, and we are extremely grateful to him for having helped us in this way. I move a very hearty vote of thanks to Sir John for his kindness in taking the chair to-day.

The resolution was carried with acclamation.

The CHAIRMAN: I am very much obliged to you, Mr. Wilks, and to you all. I think that a man without a fad is a very poor creature.

The proceedings then terminated.

OBSERVATIONS ON INDIAN PRIMULAS.*

By Sir George Watt, C.I.E., M.B., C.M., LL.D.

[Read before the Horticultural Club, October 4, 1904.]

Within the past few years remarkable progress has been made, both by botanists and cultivators, in the discovery and production of new forms of *Primula*. There are now known to exist close on two hundred species,† besides many cultivated hybrids and sports of great beauty. Roughly speaking, they may be said to be distributed within three great centres: namely, Europe, India, and China. Each of these chief centres possesses on an average about fifty species, and the balance of the total mentioned may be taken as made up by America, Central Asia, Africa, and Japan. They inhabit the temperate and arctic regions of the northern hemisphere, practically only one species —*P. magellanica*—being found in the southern hemisphere. This circumstance is perhaps the most remarkable feature manifested by the genus, but there are others equally impressive. *P. magellanica*, for example, has two great centres (New Mexico and Patagonia), separated by five thousand miles in which no trace of that plant can be discovered. But *P. farinosa* has the widest distribution of all the species, since it practically occurs in every important Primula area throughout the northern hemisphere, and yet in its diversified and wide distribution it manifests but the very slightest modification either in form or in size. Of the Indian species all without exception are confined to the Himalaya and adjacent mountains that form the North-Eastern, Northern, and North-Western frontier of India, from Burma and Assam to Kashmir and Baluchistan. None occur on the mountains of Central and Southern India, though in point of climate, soil, and associated plants they might fairly well have been looked for in these regions. So again a few species are practically met with all along the mountainous frontier of India, while others are exceedingly local. A few forms are very variable; others seem, like *P. farinosa*, remarkably constant. But Sikkim may without hesitation be pronounced the headquarters of the Indian Primroses, and many species are found in that country that would appear to occur nowhere else. The forms that spread eastward from Sikkim to Assam, Burma, and Manipur are seen to belong to an assemblage that attains its greatest development in Southern China, more especially in the mountains of the province of Yunnan. On the other hand, the types that spread westward from Sikkim to Nepal, Kumaon,

* Reprinted from Journal R.H.S. xxix. (1904), p. 295. Several plates illustrated this article on its first publication which are not reproduced here.

† Cf. the more recent estimate, p. 129.

Garhwal, Chamba, and Kashmir, are forms that reappear in Afghanistan, Persia, Central Asia, Turkestan, and Europe.

It may be here remarked that the Himalayas trend northward as they pass from east to west. Hence

1. Kashmir lies between 33° and 36° north latitude.
2. Kumaon and Bashahr lie between 29° and 31° north latitude.
3. Nepal between 28° and 30° north latitude.
4. Sikkim and Bhutan between 27° and 28° north latitude.

What influence this may have has not as yet been ascertained, but it is curious that the number of the species greatly multiplies as we pass E.S.E. And what is more curious still, this property, whatever it be, seems to continue to increase in value until Yunnan, a province of S.W. China, becomes a new centre of Primula life and one even greater than that of Sikkim.

5. Yunnan may be said to lie between 23° and 27° north latitude, thus entirely to the south of Sikkim, the link of connexion being

6. Manipur and the Shan States, between 24° and 26° north latitude.

We have this remarkable genus, which is dispersed along the great mountainous backbone of the world, evolving into at least two great types, as it is diffused from the Eastern Himalaya. Some years ago a paper of mine on *Primula* was published in the Linnean Society's "Journal." Since then I have seen cause to modify my views very greatly, and the progress made, both in India and China, has practically antiquated anything written so long ago as 1881. In my paper, however, I hinted at a classification, based on the vernation, or method of folding and packing of the leaves within the bud. This, I admit, is a distinction that botanists are not likely to appreciate very much, since it can with difficulty be detected in dried specimens. But I am addressing gentlemen who are familiar with the cultivated Primulas, and I make bold to think they may not object to a character that can be seen readily enough in the live plant. Everyone is familiar with the fact that in the common English Primrose and Cowslip the two margins of the young leaves are rolled up inwards towards the midrib on the under surface of the leaf. Equally familiar is the fact that in the Auricula or 'Dusty Miller' the one margin of the leaf is rolled on the upper surface and within the opposite margin. The former condition is denominated "revolute" and the latter "convolute." They are conditions very largely characteristic of two of the most important assemblages of Primroses in the world, namely the Indian and the European. But while Europe possesses both types, no example of a convolute Primrose has hitherto been met with in India, or, I believe, in China. There is, however, a third condition of vernation seen in *Primula*, namely "conduplicate." The leaves in this condition are simply closed together, the upper surface of the right-hand side of the blade being brought into contact with the left, like the closing of the pages of a book. Now this condition prevails in Africa (Abyssinia more

especially) and is met with in two Indian species. And what is somewhat remarkable, conduplicate vernation is usually present in Primulas that love a warm dry climate. The best-known examples of this series are *Primula floribunda* of India and *P. verticillata* of Abyssinia. In passing it may be observed that a hybrid recently appeared at Kew between these two plants which has been much appreciated by cultivators.*

I now desire to invite your attention to one or two other structural features of *Primula* that would seem to me to aid in a natural classification of the species, and thus afford useful hints for cultivation. In many species, whether the leaves be revolute, convolute, or conduplicate in bud, the flowers, when borne on a scape, are either *sessile* or *pedicellate*. The former gives origin to capitate, and the latter to umbellate forms. As the result of a fairly extensive study of Primroses, I have come to put much value on these characters, more in fact than on the shape of the flowers or even of the fruits. Primroses are spring flowers as a rule, and in consequence their attendant insects are comparatively few. The absence of a fair assortment of the agents of fertilization might easily be assumed to originate extreme and direct adaptations; hence a few thousand feet in altitude, still further lessening the supply of insects, might easily be accepted as producing many so-called Alpine species that have depended for their separate recognition on their possessing a differently shaped or differently coloured flower from that of another plant, with almost identical leaves, seen at lower altitudes. But while it is by no means an uncommon circumstance for an umbellate species to produce solitary flowers—that is, flowers borne on a simple axillary peduncle—the Alpine conditions of capitate species are, as a rule, but dwarfed states and are rarely solitary-flowered, so, conversely, in the luxuriant conditions they never become verticillate. I would next mention that the *nature of the bracts* is most valuable in classification. In the capitate forms there is a bract for each flower, but they are variously assorted in an involucre and are of different sizes. In the umbellate forms the bracts are mostly arranged in a 1-seriate whorl. So again many Primroses have obovate-spathulate *leaves* that gradually taper into winged or sheathing bases, but have no true stalks. Others have more or less rotund leaves, borne on pronounced leaf-stalks. I put considerable value on the *shape of the leaf*, when taken in conjunction with the vernation, the pedicels, and the bracts.

I trust you will not be impatient with me for going into such details, for they have a practical bearing. I am not aware of any hybrid having been made between capitate and pedicellate species, or between typical linear-oblong and rotund-leaved forms. If I be correct, therefore, in that assumption, the science of hybridization would give (and I believe it always gives) useful hints for the final determination or delineation of doubtful species. In other words, I take it that crosses are as a rule more readily accomplished between

* [The now well-known *P.* × *kewensis*.—Ed.]

allied than remote species. This at least is my apology for furnishing the classification of the Indian Primroses that I now desire to place before you.

Classification of the Indian Primulas.

A. Leaves revolute in vernation.

(*a*) *Flowers sessile* (*capitate*). (*When solitary the capitulate character is presumed to be indicated by the position of the bract outside the calyx.*)

Section 1: Denticulata.—*Leaves* thick, usually rugose and glabrous (very rarely puberulous), oblong, spathulate, serrate, and mealy. *Inflorescence* capitate, the flowers being relatively small and mostly erect, sessile or nearly so, inserted on the top of a swollen peduncle, but in number from one to many. *Corolla*, tube narrow subcylindrical, lobes bifid. *Bracts* one to each flower, the outermost gibbous, but they do not form a 1-seriate whorl, nor are they retained in an attitude parallel to each other, but when the flowers are solitary the bracts are usually very large (see *P. muscoides*).

* *North-West Himalayan Forms.*

1 (6).* *P. denticulata*, Smith; Afghanistan, Kashmir, to Sikkim, Bhutan, Khasia and Shan hills.

2 (7). *P. farinosa*, Linn.; Western Tibet and Chamba, 12–17,000 feet. Is allied to but distinct from *P. magellanica*.)

3. *P. Heydei*, Watt; Western Tibet and Chamba, 12–14,000 feet. (Creeps by means of stolons and has a distinct peduncle).

4. *P. minutissima*, Jacquem.; Baltistan, Kashmir, to Kumaon, 12–16,000 feet.

** *Eastern and Central Himalayan Forms.*

5 (1). *P. capitata*, Hook.; Sikkim and Bhutan 12–15,000 feet. (An East Himalayan species closely allied to and possibly only an alpine state of *P. denticulata*.)

6 (1). *P. erosa*, Wall.; Kumaon and Bhutan; not seen in Sikkim. (A form of *P. denticulata* with very large thin erose leaves.)

7 (2). *P. bellidifolia*, King; Sikkim, 13,000 feet. (Might almost be spoken of as a large condition of *P. farinosa*.)

8. *P. glabra*, Klatt; Sikkim, 13–15,000 feet.

9. *P. pusilla*, Wall.; Nepal and Sikkim, 13–16,000 feet. (Bracts leafy, glandular, mouth of corolla densely woolly.)

10. *P. sapphirina*, Hook. f.; Sikkim, 13–15,000 feet.

11. *P. muscoides*, Hook. f.; Sikkim, 15,000 feet.

Section 2: Soldanelloides.—*Leaves* thin, softly pilose linear obovate-spathulate, often suddenly cuneate to a winged petiole, deeply and irregularly serrate on upper two-thirds of length, never mealy. *Inflorescence* capitate, but mostly with few or even solitary flowers, which are quite sessile and deflexed or nodding. *Corolla* large, almost convolvulate in shape; petals usually emarginate and toothed. *Calyx* forming conspicuous masses, short but broad, almost

* Numbers shown within brackets denote closely allied or doubtfully distinct species.

campanulate, with blunt teeth that are generally serrulate on the margin. *Bracts*, one to each flower, very small and inconspicuous, but when the flowers are numerous they form a distinct involucre.

* *North-West Himalayan Forms.*

12 (14).* *P. Reidii*, Duthie; Chamba, 12,000 feet. (Probably only a robust N.W.H. form of *P. uniflora*.)

** *Central and Eastern Himalayan Forms.*

13. *P. Wattii*, King; Sikkim.
14 (12). *P. uniflora*, Klatt; Sikkim, 13–15,000 feet.
15. *P. soldanelloides*, Watt; Sikkim, 13–15,000 feet.

(*b*) *Flowers pedunculate* (*umbellate*).

Section 3: ROSEA.—*Leaves* linear-ovate, acute, tapering somewhat suddenly (especially the later foliage) into winged petioles, often sharply toothed, smooth shining green, glabrous, scarcely mealy. *Inflorescence* umbellate, few-flowered, never verticillate; scapes much longer than the leaves, especially when in fruit. *Corolla*, tube long, straight, relatively wide, and expanding very gradually towards the naked throat; lobes distinctly emarginate or even bifid. *Bracts* few, parallel to each other, erect, forming a 1-seriate whorl, and gibbous or even spurred below.

* *North-West Himalayan and Western Tibet Forms.*

16. *P. rosea*, Royle; Kullu and Chamba to Kashmir, 12–14,000 feet.
17. *P. Harrissii*, sp. nov.; Chitral, 8–11,000 feet.
18. *P. elliptica*, Royle; Kashmir to Ladak, 8–12,000 feet.
19. *P. hazarica*, Duthie; Hazara.
20 (21). *P. sibirica*, Jacq.; Zanskar to Lahul, 13–15,000 feet. (A smaller plant than *P. involucrata*, and with pink flowers.)

** *Central and Eastern Himalayan and Tibetan Forms.*

21 (20). *P. involucrata*, Wall.; Kashmir to Sikkim, 12–15,000 feet.
22. *P. tibetica*, Watt; Kumaon, Tibet, to Sikkim frontier, 15–17,000 feet.
23. *P. concinna*, Watt; Sikkim, Tibetan passes, 15–17,000 feet.

Section 4: PURPUREA.—*Leaves* thick, smooth, usually quite glabrous, shining, more or less mealy on the under surface only or all over, lanceolate to obovate-spathulate or even ovate-cordate, midrib flattened, expanded and veined on the surface, extending along the blade and forming a winged petiole, a large sheath or a stem-embracing scale, leaves thus frequently borne on a distinct though winged petiole, mostly serrulate on the top half of the blade. *Inflorescence* umbellate (that is to say, attached to the common peduncle by pedicels), rarely solitary, more often verticillate; scape much longer than the leaves, swollen at the extremity where the *bracts* form a more or less 1-seriate whorl, not dilated below, but sometimes connate around the pedicels, occasionally almost awl-shaped. Flowers yellow, purple, or blue, usually numerous, but occasionally few or solitary. *Corolla*, tube expanding within the

* See footnote on p. 199.

throat, mouth obstructed, often annulate and lobes entire, or emarginate or even crenate-serrate.

* *North-West Himalayan Forms.*

† *Petals entire or only faintly emarginate: throat constricted but not annulated.*

24 (25).* *P. purpurea*, Royle; Tibet, Lahul to Kumaon, 10–14,000 feet. (A very variable plant, but in its normal conditions quite distinct from *P. Stuartii*; fruit linear erect, exceeding the calyx; flowers purple).

25 (24). *P. Moorcroftiana*, Wall.; Kumaon and Kullu, 16,000 feet. (Fruit often one inch long and more than twice the calyx; flowers purple. Though a very different-looking plant, is generally treated as a variety of *purpurea*.)

26. *P. Inayati*, Duthie; Hazara, 4,500 feet.

27. *P. Stuartii*, Wall.; Tibet, Kashmir, and Chamba, also Sikkim, 12–14,000 feet. (Fruit linear, about same length as the calyx; flowers yellow perfumed.)

28. *P. Traillii*, sp. nov.; Kullu, 16,000 feet. (Fruit globular, contained within the calyx; flowers pale blue.)

** *Central and Eastern Himalayan Forms.*

29. *P. sikkimensis*, Hook.; Sikkim, in wet places, 11–15,000 feet. (Fruit globose; flowers lemon-yellow, delicately perfumed.)

†† *Petals distinctly emarginate and often crenate-serrate; throat constricted and obstructed with hairs, or furnished with a distinct annulus.*

30. *P. prolifera*, Wall.; Khasia and Naga hills, in running water, 8,000 feet. (Capsule globose: flowers yellow. Allied to, but distinct from, the Javan *P. imperialis* and also *P. sikkimensis* and *P. Traillii*.)

31 (32). *P. elongata*, Watt; Sikkim, 12–13,000 feet. (Closely allied to *P. obtusifolia*.)

32 (31). *P. obtusifolia*, Royle; Kunawar, Kumaon, Sikkim, and Bhutan.

It is by no means certain that we have correctly identified *P. obtusifolia*, Royle, and possibly two or more very distinct plants have been placed under it:—

var. *Roylei*, *Fl. Brit. Ind.*, Sundakfu, Sikkim, a purple-flowered plant at 10–12,000 feet, and a yellow condition at Yangpung at 15,000 feet. But if this be correct it is curious that while the purple-flowered forms have a strong metallic smell that causes headache if much inhaled, the yellow states have a soft delicate odour and are much like *P. sikkimensis* and *P. prolifera*. It is often seen with solitary axillary flowers and with or without umbellate scapes on the same root.

33. *P. Tanneri*, King; Sikkim, 14,000 feet. (This is the plant to which I gave the MS. name of *P. Balfouri* and issued specimens under that name before I knew of its having been described: it seems also to be *P. obtusifolia* var. *Griffithii* of the *Fl. Brit. Ind.* Flowers pale lavender-blue.)

34 (35). *P. Kingii*, Watt; Sikkim. (Flowers dark purple or claret-coloured; ruits globose.)

35 (34). *P. Gammieana*, King; Sikkim, 14,000 feet; also Yatung, Tibet. (Is possibly only a form of *P. Kingii*.)

36 (37). *P. Dickieana*, Watt; Sikkim, Lachen, 10–13,000 feet. (Flowers yellow, pubescent, not perfumed.)

37 (36). *P. Pantlingii*, King; Sikkim. (Probably = *P. Dickieana*.)

38. *P. Elwesiana*, King; Sikkim, 12,000 feet. (Flowers large, solitary, purple, softly pubescent.)

39. *P. tenella*, King; Chumbi Valley, Sikkim, 13,000 feet. (Flowers solitary, large, bluish-white, glabrous; bract outside the calyx, and flower thus sessile.)

Section 5: PETIOLARIS.—*Leaves*, originally spathulate but becoming ovate, elliptic to rotund, and more or less cordate, deeply and sharply

* See footnote on p. 199.

serrate or lobed at least on upper half, suddenly constricted into a distinct petiole (which in the early foliage may be broadly winged), usually mealy, especially the scales, certain species quite glabrous, others puberulous or even tomentose. *Inflorescence* solitary or few-flowered and umbellate; scape as long as the leaves or a little longer. *Corolla* tube most frequently not much longer than the calyx, lobes emarginate or toothed. *Bracts* forming a 1-seriate involucre, but never thickened nor gibbous below.

* *North-West Himalayan Forms.*

† *Leaves glabrous, spathulate to ovate rotund, sheaths often prominent (except P. Stirtoniana, which has the young leaves sometimes glandularly puberulous).*

40 (43, 44, 45).* *P. petiolaris*, Wall.; Simla to Kumaon (var. *scapigera* in Bhutan), Sikkim and Yatung, Tibet. var. *Edgeworthii* has rotund leaves on long petioles. 8–10,000 feet.

41 (51). *P. Clarkei*, Watt; Kashmir, 7,000 feet.

42. *P. reptans*, Hook. f.; Kashmir, 15,000 feet.

** *Central and Eastern Himalayan Forms.*

43 (40). *P. nana*, Wall.; Sikkim, 11–13,000 feet. (A dwarf plant with flowers very small and leaves thin in texture and erose, otherwise *P. petiolaris*; it flowers late in autumn.)

44 (40). *P. Stirtoniana*, Watt; Sikkim, Kanglanamo, 14–16,000 feet.

45 (40). *P. Hookeri*, Watt; Sikkim, 12,000 feet.

46 (47), *P. Dyeriana*, sp. nov.; Sikkim, Nepal, 13,000 feet. (Collected by Mr. Hartless.)

47 (46). *P. pulchra*, Watt; Sikkim, Jongri, 12–14,000 feet.

†† *Leaves usually puberulous or tomentose, rotund, and possessed of distinct petioles.*

48. *P. reticulata*, Wall.; Nepal and Sikkim, 11–15,000 feet. (This in some respects recalls *P. sikkimensis* and is also glabrous.)

49. *P. rotundifolia*, Wall.; Kashmir to Sikkim, 11–13,000 feet. (Almost glabrous.)

50. *P. Gambleiana*, Watt; Sikkim, Jongri, 14,000 feet. (Almost glabrous.)

51 (41). *P. filipes*, Watt; Bhutan on rocks, 5–6,000 feet.

52. *P. Forbesii*, Franch.; Shan States, Burma, 3,000 feet.

53. *P. Listeri*, King; Sikkim to Manipur in bamboo jungles; 10,000 in former, and 7,000 to 8,000 feet in latter.

54. *P. vaginata*, Watt; Sikkim, 10,000 feet.

55. *P. mollis*, Hook.; Bhutan. (A near ally of *P. cortusoides* and *P. sinensis*.)

56. *P. geraniifolia*, Hook.; Chumbi Valley, Sikkim, 10,000 feet. (A near ally of the European and Siberian *P. cortusoides*.)

B. LEAVES CONDUPLICATE IN VERNATION.

Section 6: FLORIBUNDA.—*Leaves* glandular pubescent, sometimes mealy, obovate-spathulate to elliptic obtuse, narrowed into a winged petiole, coarsely and irregularly toothed. *Inflorescence* umbellate and verticillate. *Corolla* yellow, tube long, lobes obcordate, small. *Bracts* few, large, leafy.

57. *P. floribunda*, Wall.; Kumaon to Kashmir and Afghanistan, 1,500 to 6,000 feet. (Allied to the Arabian and Abyssinian *P. verticillata* and *P. sinensis*.)

58. *P. Lacei*, Hemsl. et Watt; Yorkhan, Baluchistan, 4,000 feet.

* See footnote on p. 199.

I do not advance that classification as absolutely final. Indeed, there are here and there objections to it, and consequently it is possible that with a more careful and extended study of the splendid collections of Chinese species recently to hand, it may be found desirable to form one or two additional sections and to carry to these a few of the Sikkim forms, such as *P. Elwesiana* and *tenella*. But I believe future research is likely to confirm the desirability of some such classification as I have indicated. It is in strict accord with the obvious affinities of the plants one to the other, and, I am convinced, is likely to afford useful indications of the lines along which cultivation and hybridization in the future may be found most profitable. It will, for example, be seen that the panorama of Indian forms commences with plants having the leaves thick, rugose, glabrous, oblong-spathulate, mealy, and passes to those with the leaves rotund, distinctly stalked, and often pilose or tomentose. Parallel with these gradually expanding leaf conditions, we have the flowers capitate, then becoming more and more stalked, until they are completely umbellate and finally verticillate. In both conditions we meet with single-flowered states, and these are determined as capitate or umbellate according to the position of the bracts, but only when that characteristic is taken in conjunction with the nature of the leaf.

If the bract occurs immediately outside the calyx, the plant may be accepted as belonging to the capitate series, more especially if the leaves are spathulate and rugose. It may also be noted that I have referred each section to geographical groups. There are a few species that occur here and there throughout the entire Primula area of India. Others are much more local. The climate of the N.W. Himalaya being very different from that of the East, it will be found that the species of the N.W. will succeed better as a rule in Europe than those from the E. Himalaya. Partly on that account, but also in order to mark the existence of two great Indian centres, I have assorted the Primulas of India within each of the sections into (1) the N.W. Himalayan and (2) Central and Eastern Himalayan forms. And in passing I would observe that I have given each of my sections the name of the Indian species that is most characteristic of it. It might have been of more universal acceptation had I employed the names of the European wild or better-known cultivated forms, but I desired to concentrate attention on India as far as possible, and hence have chosen Indian names for my sections.

With your permission, gentlemen, I will now discuss the more striking examples of each of the sections formed by me, and at the same time mention a few of the European species that will be found to fall into these.

1. **Denticulata.**—This is the most cosmopolitan assemblage of all. *P. farinosa*, which is perhaps better known in Europe than the Indian *P. denticulata*, is fully characteristic of the series and is its English indigenous representative—the Bird's-eye Primrose. The flowers in all the members of the series are sessile, purple to

bright sapphire-blue in colour, and have narrow funnel-shaped tubes. The head of flowers is surrounded by a many-seriated involucre of bracts, the outermost more or less gibbous at the base, but not spurred.

They frequent gritty soils on grassy hillsides, or, in the case of the smaller species, moss-clad surfaces of rocks and overhanging banks, and thus appear like veritable sapphires set in green. But they grow singly, or, if clustered, rarely more than two or three are found in the clumps, one plant large and the others small. They seem to be annual or biennial, when met with on land that during winter is covered with snow. When seen in woods they choose open glades and are associated with species of Anemone, Delphinium, and Ranunculus, &c., and are then perennial. The N.W. Himalayan examples are *P. denticulata*, *P. farinosa*, *P. Heydei*, and *P. minutissima* —the last-mentioned has heads of one to three sessile flowers, while *P. Heydei* produces creeping stolons and very distinct scapes. The East-Himalayan forms are *P. capitata*, *P. erosa*, *P. bellidifolia*, *P. glabra*, *P. pusilla* (fig. 98), *P. sapphirina*, and *P. muscoides*, the last being possibly the smallest Primrose in the world.

The most abundant species is doubtless *P. denticulata*. At altitudes of from 7,000 to 13,000 feet this is often extremely abundant. Within its lower altitudes, say 7,000 to 9,000 feet, I have seen miles of country, from March to May or June, literally rendered blue with its lovely heads of flowers. In its higher altitudes, from 10,000 to 12,000 feet, it may be got in flower as late as August. In spring the flowers appear before the leaves, but are braced up by their large rufous-coloured scales, and a few young erect leaves. But though I have looked many and many a time, I never once came across either an umbellate or a single-flowered example, nor could I discover an instance where the leaves showed the slightest tendency to become petiolate. It is not uncommon, amid a mass of plants rising to as much as a foot in height, to find dwarf states—perfect in every detail and in full flower, the whole plant not exceeding 1½ inch in height. *P. denticulata* in fact, except in stature, varies remarkably little. In its lower altitudes the flowers are smaller and borne on short stalks and are usually more numerous. In its alpine conditions it has larger and fewer flowers, and the whole plant becomes stunted. The flowers are often also deeper coloured, or there is an albino condition in which the petals become almost white and the annulus around its mouth orange instead of lemon-yellow. In Sikkim I observed that the calyx had longer teeth than seen in the Simla form, and that the mouth of the corolla was also greenish-yellow. I am satisfied other botanists will confirm me in these observations, hence I think we are justified in putting faith in the characters mentioned as being closely associated with the life of at least this particular species. But when I add that all the species of my section DENTICULATA manifest a remarkable constancy, then I think the further conviction may be accepted—namely, that they form a natural and useful assemblage. The word "useful" reminds me that in

Bashahr the flowers of *P. denticulata* are regularly eaten in salad, and the powder of the roots is held to be of value in killing leeches; Professor BALFOUR informs me that in its many forms (*alba, rosea, purpurea, cashmeriana, maxima,* &c.) it is luxuriant and sows itself freely in Edinburgh.

Space will not permit me to discuss the extensive assemblage of minute species that fall into this position. The earliest known, and I believe the only one hitherto successfully grown in Europe, is *P. minutissima*. This is a North-West form, being found from Kashmir to Garhwal and Kumaon. I first made acquaintance with it while struggling with the final ascent of the Sauch pass at 15,000 feet. Snow lay on the ground here and there, filling all the lower undulations, but on the exposed surfaces I was delighted to find our little friend sparkling alongside of an equally minute yellow-flowered Ranunculaceous plant. This gave me the opportunity of resting on the steepest parts of the ascent without having to admit to my stalwart coolies that I needed repeated rests. The whole plant does not exceed an inch in height, but its beautiful purple-blue flowers with yellow throats (occasionally completely white) are fully half an inch in length. Occasionally they are solitary, more often two or three are placed on the extremity of an extremely short peduncle, the flowers being sessile within the involucre of bracts. Sometimes it is seen to throw out runners, but usually two or three of the tiny little plants form a small cluster. *P. Heydei* is a slightly larger species with coarsely pinnately serrate leaves and creeping stems, with long ascending scapes that bear small heads of beautiful blue flowers; DUTHIE found it in Baltistan. In many herbaria this species has been confused with *P. minutissima*, but the universal presence of the scape should obviate such an error.

These, then, are the types of the North-West Himalayan capitate species, but there is an Eastern group that must now be mentioned. The best-known example doubtless is *P. capitata*. This is closely allied to *P. denticulata*, but is easily recognized and preserves its distinctive features when cultivated. The scape (which appears with the fully formed leaves, not before, as in *P. denticulata*) rises to a height of a foot or more and bears a head of dark blue narrow bell-shaped flowers, the outermost whorls of which are pendent. It occurs in Sikkim at altitudes of 12–15,000 feet and in situations very similar to those chosen by *P. denticulata*, only usually a couple of thousand feet higher. Professor BALFOUR informs me that it flowers and seeds well in the Edinburgh Botanic Gardens. DUTHIE collected (in W. Nepal, at an altitude of 11–12,000 feet) what I take to be either a new species or an Alpine state of *P. capitata*. This seems a delightful little plant, at present too imperfectly known to allow of more than the affirmation that it is certainly not *P. pusilla*, to which species it has been referred.

P. erosa is also an Eastern form that is even less deserving of an independent position than *capitata*. It has large, thin, sharply toothed

and often puberulous leaves, and many small flowers on short pedicels. It occurs at lower elevations usually than *P. denticulata*, and so far has been recorded as met with in Kumaon and Bhutan only at altitudes of from 4,500 to 9,000 feet. It is of no interest from the standpoint of cultivation, since it is not a very pretty species. (Fig. 92).

P. bellidifolia is the Eastern representative of *P. farinosa* and has leaves almost tomentose. *P. glabra* and *P. pusilla* are very much like each other, except that the latter is hairy and the mouth of the corolla completely obstructed by a woolly mass. It has been repeatedly collected. I found it in August 1881 in Sikkim, on the slopes above Jongri, 14–15,000 feet. It has since then been secured by ELWES and others, while HOBSON has extended its area to Yatung in Eastern Tibet. Professor BALFOUR writes me that they have this year raised *P. glabra* from seed obtained from Calcutta.

P. sapphirina is perhaps the most beautiful of the capitate Primulas of India. The whole plant does not exceed two inches in height, but the little heads of flowers have been most fittingly accepted as justifying the name *sapphirina*. It was originally collected by Sir J. D. HOOKER in Sikkim, and has since been found by one or two other collectors, and it flowered in Kew Gardens in May 1887. Recently it has been found by HOBSON in Yatung in Tibet. *P. muscoides* is a densely tufted species and apparently the smallest of all Primulas. It is found in Sikkim at altitudes of 15,000 feet. In some respects it is much like *P. minutissima*, and is in fact the Eastern representative of that species, but it is much smaller and has the petals very much more deeply bifid.

Before leaving the DENTICULATA series I may repeat that they are perhaps the least liable to vary of all the Indian species. Alpine examples are simply dwarfed states, and never assume the condition of having solitary, exceptionally large flowers. In fact it would seem as if the tendency were to vary in lower rather than higher altitude, and by increasing the number and reducing the size of the flowers.

In conclusion I may mention that the well-known [W. Asian] *P. auriculata* doubtless belongs to this series, though the flowers of the capitulum (like those of *P. erosa*) are often shortly stalked. Its long-leaved variety much resembles *P. capitata*. *P. algida* is exceedingly like the Indian form of *P. farinosa*, and *P. capitellata*, Boiss., is not very unlike *P. bellidifolia*. So also *P. cernua*, Franch. (from Yunnan), might be characterized as a small condition of *P. capitata*, possessing the pilose leaves of *P. bellidifolia* and the pendent flowers of *P. capitata*. Lastly, *P. Viali*, Delavay, also from Yunnan, is perhaps the most aberrant of all Primroses, in that the sessile flowers are crowded on greatly elongated spikes.

2. **Soldanelloides.**—This is one of the rarest and at the same time most charming series of Indian Primulas. They are at first sight as dissimilar from the other capitate species as could well be imagined. Their soft, hairy, deeply toothed leaves, large inflated calyx, and deflexed flowers might have been expected to suggest a position for

them near to *P. mollis* and *P. geraniifolia*. But a closer inspection reveals many peculiarities that justify their association with the other capitate forms. The leaves are distinctly obovate-spathulate, never rotund-petoliate. *P. capitata* has the flowers on the circumference of the head deflexed, *P. bellidifolia* has the leaves softly pilose, and *P. sapphirina* is very much like a diminutive *P. soldanelloides*. The transition from the DENTICULATA into the SOLDANELLOIDES series is, therefore, perfectly natural and in no way disturbs the theory of affinities based on the shape of the leaf, nature of inflorescence, peculiarities of the flower, and the condition of the bracts.

I gave the name SOLDANELLOIDES as suggestive of their deflexed and nodding flowers. I might have called them *Cyclamenoides*, for the inverted attitude of the flower is perhaps more familiar in the Cyclamen. The name *Soldanella* seemed to me, however, to have the additional advantage of calling to mind their large convolvulately-shaped corollas. In fact, for the size of the plant, the flowers in these Primroses are exceptionally large and delightfully varied in colour. *P. Reidii* is pale yellow, *P. Wattii* dark purple, *P. uniflora* pink to pale lilac, and *P. soldanelloides* pure white. Until Mr. DUTHIE had the good fortune to discover *P. Reidii* in Kumaon, and Mr. LACE to rediscover it in Chamba State, all the members of the section were supposed to be confined to Alpine Sikkim. None of them occurs much below 13,000 feet in altitude, and they are all remarkably scarce plants. There do not appear to be any Primulas in Europe that could be referred to this section ; and what is more surprising still, none has as yet been found in China.*

I have never had the good fortune to come across any of these charming plants, so I cannot tell you of their habitats. But I believe a rich field for the production of delightful Primroses awaits the enterprise of whoever may successfully introduce two or more of these plants into cultivation and cross-breed them. The ease with which, I understand, *P. Reidii* has been cultivated recently in Edinburgh as a pot plant bespeaks a hopeful future for its associates. It has not as yet been established out of doors. By the by, *P. uniflora* has frequently two or three flowers, one usually fully formed and the other or others apetalous. *P. soldanelloides* seems to me perhaps the most beautiful species of the series, though I am well pleased with the lovely plant with which my friend Sir GEORGE KING did me the honour to associate my name.

3. **Rosea.**—This might be spoken of as essentially a N.W. Himalayan group. Four species are found within the country lying between Kullu, Chamba, Hazara, Kashmir, Chitral, and Western Tibet ; two are met with here and there from the extreme Western to the Eastern Himalaya, and one is confined to Sikkim. The most ready eye-mark for the members of this section is the much-elongated few-flowered umbellate scape, the pedicels of which are embraced by a 1-seriate involucre of ascending (parallel) bracts that are spurred

* But see p. 152

at the base—the spurred Primulas they might be called. The flowers appear before the leaves, and the scape and pedicels usually elongate to double their length with the ripening of the fruit. There is no more natural or more easily recognized group than this. The flowers are fairly large and brightly coloured—a peculiarity well exemplified in *P. rosea* (fig. 100) itself. The corolla tube is long, narrow, gradually expanding near the throat ; and the mouth, though usually of a paler colour than the limbs, is not furnished with an annulus.

But I must hasten to observe that *P. concinna* (fig. 99) and *P. tibetica* (especially the former), though placed by me in this group, should probably be transferred to a section by themselves, and possibly along with *P. tenella*. I leave them here as a provisional matter. Their removal would very nearly make the section be confined to the Western Himalaya and Western Tibet. *P. tibetica* has the characteristic spurred bracts of the series, but the bracts in *P. concinna*, like those in *P. hazarica*, are thickened below, but not, I believe, spurred. With an Indian distribution so strikingly Western, one would naturally look for Central Asiatic if not European species. And in this we are not disappointed, for there are several, and one, *P. egalliccensis*, occurs in Greenland. *P. longiflora* takes its name from its very long straight corolla tube—a character upon which I have laid some stress in defining the section. But of all the members of this series *P. sibirica*, Jacq., with its more robust East-Himalayan form, *P. involucrata* (fig. 101), may be said to occur on all the Alpine Himalaya from West Tibet to Kashmir and Sikkim, and is distributed through North and Central Asia to Europe, North and Arctic America. It, in fact has nearly as wide a distribution as *P. farinosa*, and indeed these two plants would appear to have been often confused the one with the other, though the capitate condition of the one and the umbellate form of the other should have instantly rendered such ambiguity impossible even had the spurred bract of *sibirica* been overlooked.

All the more characteristic members of this series frequent damp situations and grow singly, though often in more or less compact patches : that is to say, a few yards may be literally covered with a particular species, though ordinarily they do not form aggregated clumps. Professor BALFOUR informs me that this species (*P. sibirica*) has many varieties, tall and short, dark and light, large-flowered and small-flowered, and that all are easily grown in Edinburgh, and that it flowers and sows itself freely. *P. sibirica* is invariably met with as a solitary plant, and seems to manifest the elongation of the scape with the growth of the associated vegetation to a remarkable extent, the mature plant becoming a single scape 6 to 8 inches in height, and a rosette of withered leaves lying on the ground. In Edinburgh *P. involucrata* has proved a good hardy species, and flowers and seeds freely in the open.

Most of the species of spurred Primulas frequent sandy and gritty deposits, such as the tongues of soft soil that accompany the rivulets draining from ice. I can think of nothing more surprisingly beautiful

FIG. 98.—PRIMELLA PUSILLA, Wall.

FIG. 99.—PRIMULA CONCINNA, Wall.

[To face p. 208.

FIG. 100.—PRIMULA ROSEA, Royle

FIG. 101.—PRIMULA INVOLUCRATA, Wall.

FIG. 102.—PRIMULA ROTUNDIFOLIA, Wall.

[To face p. 209.

than a bed of *P. rosea* brought suddenly to view through a cleft in the terminal tongue of ice. Its rich delicate rose-purple sparkles against the background of ice, in a way that defies the jeweller's art or the beauty of the most expensive gems.

P. elliptica is a very similar species, except that the flowers are purple, not rose-pink. *P. Harrissii* is an undescribed species collected by Dr. HARRISS in Chitral, and might be described as an intermediate form between *rosea* and *elliptica*, but with the rich rose-pink flowers of *rosea*. The specimens of it seen by me are in the Edinburgh Herbarium. *P. hazarica* is distinctly a near relative of *P. elliptica*.

P. concinna, though I have spoken of it as possibly an interloper among the spurred Primulas, has been well named *concinna* and would be an ornament to any collection of Primroses. The whole plant is not more than one inch in height, but it grows in rounded cushion-like masses amid the ice, stones, and sand of the moraine. I came across it on the Kanglanamao pass in Sikkim, at an altitude of close on 17,000 feet. Its delicate scape of rose-purple flowers, with their notched coronas of yellow, might truly be described as constituting one of the most lovely members of this charming genus. I can well recollect my feelings of delight when I found a chaotic moraine besparkled with these graceful tiny flowers: they brought to mind one of my boyhood triumphs—the discovery in the far North of Scotland of *P. scotica*.

But from what I have said of the spurred Primulas you may have inferred that to grow them successfully it is essential that they should be allowed to flower within the short space of early spring. For the rest of the year they have as a rule to be protected from extreme heat, and the best possible thing to do is to plant them on a sandy bank near running water. Water preserves a more uniform temperature than either earth or air. The aquatic plants of Bengal are in consequence far nearer to the corresponding European types than are the plants grown on the margins of the tanks. Conversely, therefore, plants that require much water will bear translation from one climatic region to another better than plants that grow on dry soils. Lastly it may be added *P. Bornmülleri* is perhaps the giant member of this section.

4. **Purpurea.**—In point of number of forms this is the most important section. There are some fifteen known species, with, under some of them, numerous varieties. It is perhaps the most characteristically Indian group of all. But the name PURPUREA is perhaps not so fully representative as could have been desired. It is one of the oldest descriptive names, but one that has been perhaps more obscured by conflicting opinions than any other that might have been chosen. In point of colour of flowers, yellow is very much more prevalent than purple, and many of the species possess both yellow and purple states or varieties. Then again as to the position assigned to the section, it might have been placed as No. 5 instead of No. 4, thus bringing PETIOLARIS or petiolate-leaved forms into juxtaposition with the

ROSEA series, which have often somewhat petiolate leaves. So again the inflorescence of the PURPUREA group is very frequently verticillate, a condition that becomes general, if not universal, in the sixth section —FLORIBUNDA.

The central feature of the PURPUREA series may be said to be the glabrous mealy obovate-spathulate leaves, with their greatly expanded midrib forming a sheathing petiole. Flowers large, mostly yellow, or purple or blue. Corolla tube long, erect, inflated in the throat. The purple flowers are either odourless or possess a heavy metallic smell, while the yellow-flowered species have invariably a delicate sweet and refreshing odour. It is a little more difficult to define this assemblage than some of the others, but once seen it is easily enough recognized. The bracts are numerous, never gibbous, but in the outermost whorl are often more or less united together.

The species may be referred to two geographical groups, and these very nearly correspond to two sections that may be formed according to the shape and condition of the corolla :—

(1) *Petals entire or faintly emarginate ; throat constricted but not annulated.* 1, *P. purpurea,* Royle, proper, and the variety or species known as *Moorcroftiana ;* 2, *P. Stuartii,* Wall. ; 3, *P. Inayati,* Duthie ; 4, *P. Traillii,* sp. nov. ; and 5, *P. sikkimensis,* Hook.

(2) *Petals distinctly emarginate and often crenate-serrate ; throat constricted and obstructed with hairs or by a distinct annulus.* 6, *P. prolifera,* Wall. ; 7, *P. elongata,* Watt ; 8, *P. obtusifolia,* Royle, and its variety *Roylei ;* 9, *P. Tanneri,* King ; 10, *P. Kingii,* Watt ; 11, *P. Gammieana,* King ; 12, *P. Dickieana,* Watt ; 13, *P. Pantlingii,* King ; 14, *P. Elwesiana,* King ; and 15, *P. tenella,* King.

Of this long list only four can be claimed for the North-West Himalaya (but these are exceedingly characteristic and often very prevalent), two are dispersed into the Central Himalaya, and one finds its way to Sikkim. All the others are East-Himalayan forms and constitute a series by themselves, easily separated from the North-West Himalayan group and one which attains its greatest development in South China. It would occupy far too much of your time to attempt, however briefly, a discussion of all the species indicated. I must content myself therefore with a few of the more striking examples.

WALLICH was apparently the earliest botanist who studied these plants, and he named one of them after Dr. STUART of the Punjab. Unfortunately, the sheet that is now accepted as WALLICH'S type (No. 606) bears two plants, one *P. purpurea,* Royle, and the other *P. Stuartii,* Wall. proper. STUART'S own specimen, now preserved in the Edinburgh Herbarium, contains three very distinct plants. It has in consequence become customary to speak of the forms indicated as different species : ROYLE having been assumed to have picked out one of the two Wallichian plants and given it a separate name, thus left the other to be *P. Stuartii* proper. There would be no great harm in admitting that view, and the names have for many years been so

accepted. Unfortunately some botanists regard ROYLE's plant as at most but a variety, so that, if that opinion be adopted, the specific name for both, of necessity, becomes *P. Stuartii*. From practical considerations, I am not disposed to attach much importance to whether two Primroses, long accepted as separate species, which are easily recognizable from each other and have never, so far as is known, been produced under cultivation from the selfsame seed, should have the dignity of specific or only of varietal positions assigned to them. But this much may be advanced in support of specific values, viz., that the European and Asiatic parallel series, namely *P. nivalis* and its numerous allies, have been for the most part accepted as species. In the present instance a still stronger argument, however, presents itself, namely in the fact that *P. Stuartii* is nearly, if not quite, as difficult to separate from *P. sikkimensis*, *P. elongata*, and even *P. reticulata*, as from *P. purpurea*. In fact, if the foliage only be examined, to the list of species separable with difficulty from *P. Stuartii* would have to be added *P. Traillii* and *P. prolifera*. *P. Traillii* has pale blue flowers, *P. purpurea* purple flowers, but all the others have lemon-yellow flowers, and even *P. obtusifolia* has both purple and yellow flowers. Indeed, luxuriant specimens of the yellow-flowered condition of *P. obtusifolia* can with difficulty be separated from the *Stuartii-sikkimensis* series. The yellow-flowered primroses of India constitute, therefore, a most perplexingly difficult group. In fact, they can alone be isolated one from the other by relative qualities.

P. purpurea, Royle. Leaves obovate-spathulate, almost entire. Flowers purple, forming compact umbels; capsules often twice the length of the calyx. Found on exposed hillsides, seeking the shade of overhanging banks and preferring rich mouldy soils. DUTHIE collected in Hazara a yellow-flowered form of this plant which is very different from *P. Stuartii* and has the protruding capsules of *P. purpurea*.

P. Stuartii, Wall. Differs from *purpurea* in the leaves being minutely serrate. It is usually found in much wetter situations, preferring in fact, like *P. sikkimensis* and *P. prolifera*, watercourses. Flowers lemon-yellow on long spreading pedicels; capsules the length of the calyx. The Cambridge Botanic Gardens are supposed to have grown it in 1887, but their specimen in the Kew Herbarium seems to me to be rather a yellow-flowered form of *P. obtusifolia*.

P. sikkimensis, Hook. Leaves tapering into a winged petiole; coarsely serrate. Fruits globose, shorter than the calyx. Frequents marshy situations. *P. serratifolia*, Franch., from Yunnan, is probably only a form of *P. sikkimensis*.

P. Traillii, sp. nov. Leaves elliptic-spathulate, distinctly wing-petiolate. Flowers verticillate, pale blue; carpels contained within the calyx. Found under shade of rocks in dry situations at great altitudes.

P. Inayati, Duthie. A Hazara plant, found at low altitudes (4,500 feet), which is possibly intermediate between *P. sikkimensis* and *P. prolifera*. The scapes are shorter than the leaves, and the fruits contained within the calyx.

P. prolifera, Wall. Leaves very large, obovate-spathulate, not petiolate. Flowers small, many, verticillate and yellow; capsules globose (allied to *P. imperialis*, but quite distinct). It is found in marshes or on the banks of streams, at altitudes of 8,000 feet.

P. reticulata, Wall. Leaves with a distinct petiole, bearing an oblong cordate blade; scape much elongated. Flowers relatively small, yellow, Fruits globose. Found in marshy places.

It will thus be seen that if the characters that separate *P. purpurea* from *P. Stuartii* be not recognized, all the above species (except perhaps *P. reticulata*, which does not belong to this section) would very possibly have to be treated as varieties of one and the same species.

Professor BALFOUR writes me that they have had under cultivation several of these species, and one plant raised in that garden I believe must be accepted as a cross between *P. Stuartii* and *P. sikkimensis*. The last mentioned (*P. sikkimensis*), he tells me, is best grown as a biennial, when it flowers and fruits profusely. It will live and flower for several years, but for successful cultivation a short life is preferable. It is a most profuse grower in the open air.

Of *P. obtusifolia* the Professor writes that it is a fine hardy species, but not very free; perhaps we have not given it much attention. This occurs in India on grassy hillsides, and where met with is exceedingly plentiful. In Sikkim I found miles of country literally covered with it, and its strong metallic smell was so overpowering that I and most of my party got severe headaches. A little higher we came on a yellow-flowered form of the same plant that had a delicate perfume.

P. elongata was originally collected by Sir J. D. HOOKER. It has since been gathered by JAFFREY, PANTLING, and others, at altitudes of 11–13,000 feet. Sufficient material has thus come to light to justify its separation from *P. obtusifolia*. It flowers in June and has the leaves of *sikkimensis*, but with greatly elongated corolla tubes. The flowers are very delicate, the petals thin, glabrous and veined.

A plant that I take to be possibly a form of *P. elongata* was found by me in Sikkim. It has large pendulous flesh-coloured flowers, the petals being thick and woolly in texture. It has the most delicate perfume of any plant I ever came across. It is not as yet named, is but imperfectly represented in herbaria, and may prove a good new species.

P. Traillii has been mentioned by me already, but I may say a few more words about it. I found it in Upper Kullu in 1894, at altitudes of 15–17,000 feet. It was in flower and ripe fruit in October, so I presume it has at least two flowering seasons—spring and autumn. It was found under the shade of large rocks growing in a dry, soft, powdery soil. The leaves were as much as twelve to eighteen inches long, very like those of *P. imperialis*, but the flowers were pale blue. I regard it as a perfectly good and new species, and have proposed to name it in honour of the Rev. J. TRAILL of Jaipur. The seed I collected of it was mixed with the only other Primula found in Kullu

during that expedition, namely *P. involucrata*, on account of the necessity that existed to economize my collecting materials. On the mixed seed reaching Europe it was found that only *P. involucrata* germinated, and this got talked of as *P. Traillii*—thus a laugh was turned against me. The botanical specimens that I brought away with me show, however, that I was unfortunate in my seed, but that the plant was a genuine find, and one which cultivators will much appreciate when it is ultimately successfully introduced.*

Its nearest Indian affinity is with *P. prolifera*, a species found in the Khasia and Naga hills at much lower altitudes (8,000 feet), growing in damp places and producing yellow flowers. But it is much closer to *P. japonica*, except that in that species the flowers are much larger and dark purple.

P. prolifera is a delightful low-level species, frequenting water-courses. It has been collected in Sikkim at 12,000 feet. Has been long known to be found in the Khasia hills at 4–6,000 feet, but in 1897 I extended its area to the Naga hills (altitude 7,500 feet). The plant collected by GRIFFITH in Bhutan I believe to be distinct, and closer to *P. imperialis* than *P. prolifera*.

P. Tanneri, King, was another find of mine in Sikkim, which had been collected previously, but confused with *P. obtusifolia* var. *Griffithii*. It is a good species found in Rhododendron glades and possessed of very beautiful pale lavender-coloured flowers.

P. Kingii, Watt, is a lovely plant met with in Sikkim. It has leaves shaped as in some forms of *P. purpurea*, only smaller, thicker, and almost leathery in texture. Flowers usually pendent, and of such a dark claret colour that they are almost black. This species, I believe, would be much admired were it introduced into cultivation. I found it in full flower at 14,000 feet, and most collectors have done the same, the result being that we have not as yet got the seed. It has been collected in Tibet by HOBSON. *P. Gammieana*, King, I believe to be at most a variety of this species, and still another allied form, *P. amethystina*, Franch., has come from Yunnan.

P. Elwesiana, King, is perhaps the most striking Primula of Sikkim. It occurs at altitudes of 12,000 feet. It has large, solitary, deflexed flowers, borne on much-elongated, thickened, and pilose peduncles, destitute of bracts. It is the representative of a Chinese group of great beauty, of which *P. vinciflora* and *P. Delavayi* of Franchet are superb examples. These have recently been procured from the mountains of Yunnan, and may yet with further study be found to constitute a sub-genus. They recall in some respects *Bryocarpum*.

Perhaps the best-known cultivated example of a Primrose belonging to this section would be *P. nivalis*, Pall., especially the var. *turkestanica*. It is found in Turkestan and Persia, and thus keeps up the character

* [Mr. G. F. WILSON grew the plant in question at Wisley and described it in *Gard. Chron.* xxii. (1897), p. 263, under the name *P. Traillii*. The figure given there leaves no doubt that *P. involucrata*, which still flourishes at Wisley, was the plant referred to under the new name.—ED.]

of this assemblage, being strongly N.W. Himalayan. The form of *P. nivalis* collected at St. Matthew Island during the British Behring Sea Commission still further preserves this peculiarity. It might be described as closely allied to variety *Moorcroftiana*. And, as if to confirm the reduction of *P. Stuartii* to *P. purpurea*, there is a yellow-flowered form of *P. nivalis* that has been described by REGEL as var. *Bayernii*. The Altai form of *P. nivalis* corresponds closely with the leathery-leaved form of the Indian condition, for which at one time I proposed the name *P. plantaginea*—a smaller plant, with narrower leaves than *P. Moorcroftiana*.

5. **Petiolaris.**—This in more senses than one may be described as the most sportive assemblage of Indian Primulas. The species thrown together under it are not only found to vary freely, according to soil, exposure, altitude, &c., in which met with, but they obey the dictates of cultivation almost instantly. The central feature that separates the group may be said to be the presence of a distinct petiole in place of the spathulate-cuneate sheathing base of the leaf met with in the majority of the species placed in the other sections of this classification. The name PETIOLARIS at once suggests that peculiarity, but, strangely enough, it has been given to the species of the assemblage that is least petiolate, namely *P. petiolaris*. There have been described in the "Flora of British India" seven varieties of that species, but with a very little stretch of imagination that number might easily be doubled. In three of these varieties the leaves are usually obovate-spathulate-sessile, but occasionally a rotund leaf borne on a long naked petiole may be found. In the other varieties, petiolate leaves are universally present, along with spathulate sessile leaves, and in one form, that called *Edgeworthii*, the heart of the plant consists of a compact rosette of small sessile leaves, while placed on the circumference are many very large ovate-elliptic leaves, borne on petioles 3 to 6 inches long. Lastly, the flowers may be solitary axillary, or crowded within the axils, on either an exceedingly short or a greatly elongated common stalk. One variety, *scapigera*, has a whorl of petiolate, perfectly formed, but minute leaves, in place of the bracts, surrounding the umbel of long pedicels. Among the spathulate-sessile-leaved forms, one which WALLICH named *nana* has linear-oblong sharply toothed (erose) leaves, and usually large solitary flowers. From this form the transition is almost imperceptible into *P. Stirtoniana* and *P. Hookeri*. These might in fact be viewed as alpine states but for one circumstance, namely, that while the mouth of the flower in *P. petiolaris* is open and never obstructed by an annulus, both these alpine plants have the throat constricted by a distinct annulus. Whether this is only a special sexual adaptation to facilitate fertilization or is a specific structural peculiarity, I cannot at present say. I have accordingly retained them as species, but *P. petiolaris* varies so remarkably that it would be no great stretch of imagination to uphold the forms mentioned as only alpine states of the protean species *P. petiolaris*.

In point of colour of flower there is less variability than in shape of flower, form of leaf, and degree of mealiness. The alpine states have as a rule much larger flowers than those of lower altitudes. And what is more surprising still, while the low-level forms are seen to originate large clumps, within crevices of rocks in damp situations or even under the spray of waterfalls, the alpine forms prefer the shade of bamboo or pine. They invariably form large clumps, often a foot or more in diameter, and are seen very frequently as one mass of bright rose-purple to pale lilac flowers with yellow throats. But there is still another circumstance that I think it is well to mention. The whole of the clumps in one neighbourhood flower simultaneously and have repeated flushings throughout the year. On April 20 I passed along the Toungloo range in Sikkim when *P. petiolaris* was a blaze of flowers. I returned twenty days later along the same path and could not discover a single flower. I have collected it in flower from March to September, though it is best in May and June.

I have gone into these details with *P. petiolaris* because I think it is a much-neglected beautiful species. It sports almost too freely, is perennial, and easily grown if liberally supplied with water or planted alongside of limestone rocks. I have another reason: it is very largely representative of the series with which I am at present dealing. To understand them fully, however, it is desirable that I should classify the *petiolaris* section a little more in detail. There may be said to be two great subsections :—

1. Leaves glabrous or nearly so, and ovate-spathulate to subrotund, sheathing. The species are *P. petiolaris* in all its forms, also *P. Stirtoniana* and *P. Hookeri*. Then a special group that have large sheaths on an erect stem, viz. *P. pulchra* and *P. Dyeriana*. Lastly two plants, *P. Clarkei* and *P. reptans*, that I place here because of their being glabrous N.W. Himalayan forms, but they might otherwise more naturally be assigned positions in the set that follows.

2. Leaves puberulous or tomentose, rotund, and possessed of distinct petioles. The examples are *P. reticulata*, *P. rotundifolia*, *P. Gambleiana*, *P. Forbesii*, *P. Listeri*, *P. vaginata*, *P. mollis*, and *P. geraniifolia*.

I desire to bring before you only the more striking facts of the classification with a view to establishing general principles that I think may be of practical value. No single character in the above diagnostic separation would by itself be of any real value, but when taken in the aggregate they are of great assistance. For example, were we to simplify the above into glabrous and puberulous forms we should instantly meet with numerous stumbling-blocks. I need but mention that *P. reticulata*, *P. rotundifolia*, and *P. Gambleiana* are often almost glabrous. So again leaves spathulate and leaves petiolate would be useless characters by themselves, since, as I have just said, both conditions may be met with on one and the same plant. Still again, flowers solitary or flowers umbellate would be quite misleading, since both these conditions may be seen on the same root. But when we

speak of umbellate Primroses with pilose rotund petiolate leaves, we indicate a readily recognizable and perfectly natural series, a series that embraces many of the most charming cultivated plants that exist. I need but mention the Chinese Primrose, with its endless varieties and races, and the urticating *P. obconica*, to bring instantly to your minds plants that would fall into this position. I am on dangerous ground, however, when I venture to speculate, before an assembly of practical men, as to what has been done or cannot be done by hybridization. I feel that I am, however, safe in saying that it would be most surprising to learn that *P. sinensis* had been successfully crossed with *P. farinosa* or even with *P. petiolaris*.

In Kashmir, Mr. C. B. CLARKE collected the plant that now bears his name. It is the most Western member of what I should like to call the Indian SINENSIS series, but it is not pilose-tomentose. In Sikkim, Manipur, and the Naga hills *P. Listeri* occurs, in Bhutan *P. filipes*, and in the Shan States *P. Forbesii*—a species suspiciously like some of the hairy forms of *Androsace*. These all possess subrotund, cordate, pilose-tomentose leaves. The inflorescence is a lax-flowered umbel (often verticillate) with long spreading pedicels, and the calyx loose campanulate with broad teeth. That description may have again called to mind *P. obconica*, and it is undoubtedly a close ally of the series. Fortunately, none of our Indian examples have, however, the evil reputation of that plant, but *P. Listeri* has a most remarkable smell that brings to mind the odour of *Geranium Robertianum*.

From these the transition passes (possibly through *P. vaginata*) easily enough to *P. mollis* and *P. geraniifolia*. And these little-known but charming Indian species at once suggest the European *P. cortusoides*, the Turkestan *P. Kaufmanni*, as also the Chinese *P. sinensis*. In fact, some of the verticillate forms of *sinensis* even, are suspiciously like hybrids with *P. mollis*.

This, then, is our specially Eastern series of Primroses. A few years ago hardly any of them were known. I believe I was the first to find *P. Listeri* in Sikkim. The year following I carried its habitat further to the East by finding it in Manipur and the Naga hills. It has since been found in Upper Burma, and I should not be surprised to learn that it had been collected in China, but it would astonish me very much indeed to hear of its being found in the North-West Himalaya. The story of *P. Listeri* is true of most if not all the other round-leaved hairy forms that have been recently discovered in Sikkim and Eastern Tibet. They are more Chinese than Indian plants, and accordingly Sikkim may be viewed as their most Western habitat.

But we have another rotund-leaved series of Primulas that is more Indian in character than those briefly indicated. The best example of this is *P. rotundifolia*, and other examples are *P. Gambleiana* and *P. reticulata*. But, as already mentioned, these are almost glabrous plants. I cannot detain you by going into details regarding them, but shall mention one or two facts. *P. rotundifolia* (fig. 102) practically occurs throughout the Himalaya from Kashmir to Sikkim, at altitudes of 10,000 to 12,000 feet. It is fond of a rich peaty soil, being usually

met with in dry shade, such as under shelving rocks in Rhododendron glades. It is a delightful plant, growing in fairly large clusters, each stem being embraced near the ground by large sulphurous scales. The under-surfaces of the leaves, as also the petioles, are coated with white farina. Petioles long, erect, the scapes nearly double the height of the leaves, becoming from 6 to 9 inches in height, and bearing two whorls of bright purple-pink flowers with strongly marked yellow throats, and faintly but sweetly perfumed. Professor BALFOUR writes me that they have had it growing in Edinburgh for the past couple of years. It grows freely in pots, and promises to be an acquisition.

Its nearest ally, *P. Gambleiana*, occurs at slightly higher altitudes, but is confined to Sikkim. It is a superb species, found growing almost epiphytically on banks of damp moss. Flowers large, purple-pink with yellow throats, constricted and annulated.

P. reticulata is the link of connexion with the PURPUREA series of Primulas. It is in fact much like a small form of *P. sikkimensis*, with distinctly petiolate oblong cordate leaves, the scape relatively much elongated, the corolla tubes narrow, much-exserted mouth, not annulated, and the fruit ovoid, contained within the calyx. Professor BALFOUR informs me that in the Edinburgh Botanic Gardens they have not made much use of this plant. It has been grown for years, and is as easy of cultivation as *P. sikkimensis*.

But I have said enough. I have established fairly satisfactorily the existence of a Sikkim series of round-leaved puberulous Primroses that becomes still further elaborated in the mountains of Southern and South-Western China. I have also indicated an Indian series of glabrous rotund-leaved species. It is significant how persistently the presence or absence of hairs on the leaves points to their origin. Given a glabrous Indian Primrose, and I should almost from that circumstance alone hazard the opinion that it had most probably come from the N.W. Himalaya. If this is a mere coincidence it is one that runs parallel with many others. The peculiarity suggested may of course be indicative of climatic influence, but, whatever its cause, it in many cases denotes forms that may be grown successfully out of doors in England, whereas the hairy species almost invariably require glass.

6. **Floribunda.**—There is very little to say regarding this group further than has been already observed. They have the leaves conduplicate in vernation. They would appear to be the warm temperate Primulas, and to be more African and Arabian than Indian. In passing it may be observed that in the classification of geographical areas pursued at Kew, a portion of India is placed along with North Africa and the Orient, namely Baluchistan and Afghanistan. That is the very region where the Primulas of this section attain their highest development. *P. floribunda* occurs in clefts on damp rocks from Kumaon to Simla and Kashmir, at altitudes from 3,500 to 6,000 feet. In its area, however, the altitude is gradually lowered on passing westward, until in the Northern Punjab it occurs almost at the level of the plains. And what is perhaps more significant still, with the

depression of altitude, the plant becomes larger, more robust, quite glabrous, often mealy, and the bracts foliaceous. General Sir J. MACDONALD sent me many years ago samples of this plant from the Khyber Pass. These, in my opinion, break down the separation of *P. verticillata*—the Abyssinian member of this series—from *P. floribunda*. You are all aware, gentlemen, that a hybrid plant appeared some years ago at Kew, between these two species. This has since been grown by many Primula cultivators, and much has been said regarding the extraordinary improvement thereby effected, the hybrid being in some respects superior to either of its ancestors. The leaves are large, glabrous, and copiously coated with white farina. These facts but confirm the observations to which I have endeavoured to invite your attention. The two plants are closely allied; hence hybridization, in my opinion, becomes natural and easy. And the new form followed the tendency of becoming more luxuriant under altered circumstances, exactly as *P. floribunda* does naturally in India on passing westward to lower altitudes.

Recently my friend Mr. J. H. LACE made a delightful discovery in Quetta of a new species belonging to the FLORIBUNDA section which has now been named *P. Lacei*. This has a suffruticose habit, and frequents shady places in limestone rocks. It is very much more beautiful than any other member of this group, its soft woolly leaves being in themselves very charming, but its flowers are very beautiful. For the size of the plant they are remarkably large, and of a delicate yellow colour.

I fear I must have trespassed sadly on your patience. But I have endeavoured to bring before your mind's eye a panorama of the Indian Primulas assorted under a new classification. The contention that I have tried all through to impress upon you is not the merits of that classification *per se*. It doubtless has many defects, but it seems to me to bring together plants that are related to each other. If this be so, we have the key to successful cultivation and to future hybridization; for, while I believe anything possible, I am convinced that to be successful hybridization should advance stage by stage with the closely allied forms before the more remote are attempted. And what is even more important, I am convinced that hybridization should not only follow the guiding hand of systematic affinity, but be governed by observation of habitats and dispositions. *P. Traillii*, I have shown you, is structurally related to *P. prolifera*, but the one grows in the North-West Himalaya in dry soils under the shadow of rocks at altitudes of 15–17,000 feet, and the other in the extreme East, frequenting open marshy glades or the margins of streams at altitudes of 5,000 to 8,000 feet. I should hesitate to attempt the cross-fertilization of these two plants, even though they are undoubtedly nearly allied species botanically. What is desired by hybridization is improvement of the attractive features of a plant, and to that end I believe luxuriant growth is essential. It is therefore necessary to study the natural tendencies of life, quite as much so as to select plants which, when crossed, would produce a good combination of beautiful forms.

NOTE ON PROFESSOR PAX'S ARRANGEMENT OF THE GENUS PRIMULA.

By the Editor.

In the papers read at the Primula Conference, frequent reference is made to the sections of the genus made by Professor Pax in his recent monograph,* and in several cases modifications of his arrangement are suggested. We have therefore drawn up a brief outline of Pax's classification, and give the names of one or two typical species opposite each of the twenty-one sections into which he divided the genus.

In almost all Primulas the young leaves have their margins rolled backward when they first emerge from the bud, but in two sections. (4) Floribundae and (21) Auricula, the margins of the young leaves are rolled inwards. These two sections are thus readily distinguished from all the others, and the point is not mentioned again below.

Section 1. Sinenses, Pax (26 species †). Leaves distinctly petiolate, lobed, dentate or crenate.

e.g. *Primula sinensis, P. obconica, P. cortusoides, P. mollis.*

Section 2. Fallaces, Pax (4 species). Leaves petiolate, cordate, thin, rugose, hairy; inflorescence 2–6-flowered, bracteate.

e.g. *P. jesoana, P. Reinii.*

Section 3. Monocarpicae, Franch. (4 species). Leaves slightly lobed; calyx enlarging after flowering.

e.g. *P. malacoides, P. Forbesii.*

Section 4. Floribundae, Pax (6 species). Leaves thin; flowers in superposed whorls with involucres of leafy bracts.

e.g. *P. floribunda, P. verticillata.*

Section 5. Petiolares, Pax (7 species). Leaves almost or quite glabrous, narrowed to their insertion, dentate, with a wide midrib; flowers large, stalked, arranged in an umbel, on a long or very short scape (comparable in this with the common primrose); capsule globose.

e.g. *P. petiolaris*, [*P. Winteri*].

Section 6. Bullatae, Pax (5 species). Leaves coriaceous, hairy, short; flowers stalked.

e.g. *P. bullata.*

Section 7. Carolinella, (Hemsl.) Pax (4 species). Like section 6, but with large leaves.

e.g. *P. megaseaefolia, P. Henryi.*

Section 8. Vernales, Pax (8 species). Leaves membranous, rugose, usually narrowed to the base, rarely cordate; flowers stalked.

e.g. *P. acaulis, P. elatior, P. Juliae.*

* Pax, F., and Knuth, R., in Engler's *Das Pflanzenreich*, Heft 22, *Primulaceae* (1905).

† In Pax's arrangement.

Section 9. SOLDANELLOIDEAE, Pax (15 species). Leaves more or less hairy; flowers not or but shortly stalked, bracts short and broad.

e.g. *P. uniflora, P. Reidii.*

Section 10. FARINOSAE, Pax (24 species). Leaves glabrous or nearly so; flowers more or less stalked, bracts saccate at base.

e.g. *P. farinosa, P. frondosa, P. longiflora, P. rosea.*

Section 11. CAPITATAE, Pax (11 species). Characters as under section 9, but with lanceolate or subulate bracts; flowers stalked or not.

e.g. *P. denticulata, P. capitata.*

Section 12. MINUTISSIMAE, Pax (3 species). Plants small or minute; leaves toothed; plant stoloniferous.

e.g. *P. minutissima.*

Section 13. TENELLAE, Pax (7 species). Plants small; leaves small, glabrous or nearly so, leaves subcoriaceous, narrowed to the petiole; flowers one or two on a scape; capsule globose.

e.g. *P. yunnanensis.*

Section 14. NIVALES, Pax (15 species). Leaves glabrous or nearly so, entire or denticulate, petiole winged; capsule cylindrical.

e.g. *P. sikkimensis, P. Stuartii, P. nivalis.*

Section 15. OMPHALOGRAMMA, Franch. (4 species). Leaves not lobed; plant without stolons; bracts absent; flowers solitary.

e.g. *P. Elwesiana.*

Section 16. MACROCARPAE, Pax (10 species). Glabrous or nearly so; leaves contracted to a petiole, cuneate or rounded, dentate at apex; capsules cylindrical or ovoid.

e.g. *P. suffrutescens, P. Souliei.*

Section 17. CALLIANTHAE, Pax (16 species). Glabrous or nearly so; leaves coriaceous, obtusely denticulate; flowers umbellate, very shortly stalked; capsules globose.

e.g. *P. vittata, P. Kingii.*

Section 18. CORDIFOLIAE, Pax (5 species). Glabrous or nearly so; leaves cordate at base, petiolate; corolla infundibuliform; capsule cylindrical.

e.g. *P. rotundifolia, P. pulchra.*

Section 19. SREDINSKYA, Stein (1 species). Characters as section 18, but corolla cylindrical.

P. grandis.

Section 20. CANKRIENA, (de Vriese) Pax (11 species). Glabrous or nearly so; leaves membranous or papery, serrate or dentate, narrowed to the petiole; flowers in tiers of umbels; capsule globose.

e.g. *P. japonica, P. Cockburniana.*

Section 21. AURICULA, Pax (22 species). Leaves more or less coriaceous; flowers in umbels; bracts not leafy. This section is divided by Pax into seven subsections as follows:—

EUAURICULA, Pax (2 species). Leaves fleshy, entire or dentate; bracts short, broad; calyx short; flowers yellow.

P. Auricula, P. Palinuri.

BREVIBRACTEATAE, Widmer (3 species). Characters of Euauricula, but flowers violet or rose.

P. viscosa, P. marginata, P. carniolica.

ARTHRITICA, Schott (4 species). Leaves coriaceous, entire margin cartilaginous; bracts narrow, elongated; calyx long; flowers rose.

P. Clusiana, P. spectabilis, P. glaucescens, P. Wulfeniana.

ERYTHRODOSUM, Schott (6 species). Leaves fleshy, without farina, dentate, with reddish glandular hairs; brac s short; flowers rose or purple.

e.g. *P. cottia, P. hirsuta.*

RHOPSIDIUM, Schott (4 species). Leaves as in Erythrodosum, but glandular hairs colourless; bracts elongate; flowers rose or violet.

e.g. *P. Kitaibeliana, P. Allionii.*

CYANOPSIS, Schott (2 species). Leaves fleshy, glabrous, sticky; bracts broad; flowers bluish-violet.

P. glutinosa, P. deorum.

CHAMAECALLIS, Schott (1 species). Leaves fleshy, cuneate. apex truncate, serrate; bracts elongate; flowers rose.

P. minima.

EUROPEAN SPECIES OF PRIMULA, WITH SYNONYMY.

[The following list is based upon the arrangement in Pax's monograph in Engler's "Pflanzenreich." It does not contain a complete synonymy of the European forms, for many of the old names were given to groups which have subsequently been divided into several sections and given distinct specific names; the synonymy is therefore frequently very much involved. It is hoped that the list will be useful to cultivators, however, and an endeavour has been made to include all the names under which European Primulas appear in garden lists. Hybrids have been left out of this list, as Mr. FARRER has appended a synonymic list to his paper on p. 125.—ED.]

* **Primula acaulis** (L.) Hill. (Sect. VERNALES.) Central Europe and Mediterranean Region.

var. **balearica,** Willk. Balearic Is.

* var. **rubra**, Sibth. et Smith. E. Mediterranean Region.

P. alba plena, Hort. = **P. acaulis** form.

P. Allionii, Hauss. = **P. tyrolensis**.

* **P. Allionii,** Loisel. (Sect. AURICULA-RHOPSIDIUM.) Maritime Alps.

P. alpestris = **P. elatior** var. **carpathica** f. **subarctica**.

P. alpina, Loisel = **P. viscosa.**

P. alpina, Salisb. = **P. Auricula**.

P. altaica, Lehm. = **P. farinosa** subsp. **dahurica** var. **intermedia.**

P. altaica, Pall. ex Ledeb. = **P. elatior** var. **Pallasii.**

P. ambigua, Salisb. = **P. elatior.**

P. americana, Rydb. = **P. farinosa.**

P. amoena, of some lists, non Marsch = **P. acaulis** var. **rubra.**

* **P. apennina,** Widmer. (Sect. AURICULA-ERYTHRODOSUM.) Northern Apennines.

P. atropurpurea, Hort. = **P. acaulis** var. **rubra.**

P. Auricula, All. = **P. marginata.**

P. Auricula, Hill = **P. farinosa.**

* **P. Auricula,** Linn. (Sect. AURICULA-EUAURICULA.) Alps and S. Vorarlberg from Dauphiné and Savoy to Lower Austria and Servia.

* var. **Bauhini**, Beck. Alps and Carpathians.

var. **Widmerae**, Pax. Black Forest.

* var. **Obristii** Beck. Vorarlberg and W. Carpathians.

* var. **ciliata,** Koch. S. Alps and Apennines.

P. Balbisii, Lehm. = **P. Auricula** var. **ciliata.**

P. baldensis, Goiran = **P. spectabilis.**

P. bellunensis, Venzo = **P. Auricula** var. **ciliata.**

P. Benkiana, Borbás = **P. elatior** var. **carpathica** f. **Benkoiana.**

P. bicolor, Rafin. = **P. acaulis.**

* These plants are in gardens.

P. Bonjeani, Hugu. = **P. pedemontana.**
P. cadinensis, Porta = **P. oenensis.**
P. calycina, Reich. = **P. spectabilis**, **P. glaucescens** and **P. Wulfeniana.**
P. Candolleana, Reich. = **P. integrifolia.**
P. canescens, Opiz = **P. officinalis** var. **canescens.**
* **P. carniolica**, Jacq. (Sect. AURICULA-BREVIBRACTEATAE.) Maritime and Cottian Alps.
P. carniolica, Pollini = **P. spectabilis.**
P. carniolica, Wulf. = **P. Wulfeniana.**
P. carpathica, Fuss = **P. elatior** var. **carpathica.**
P. ciliata, Moretti = **P. Auricula** var. **ciliata.**
P. ciliata, Schrank = **P. hirsuta.**
P. Clusiana, Weiss = **P. Wulfeniana.**
* **P. Clusiana**, Tausch. (Sect. AURICULA-ARTHRITICA.) Austria.
P. Clusii, Wiest = **P Clusiana.**
P. Columnae, Schur. = **P. elatior** var. **carpathica** f. **Benkoiana.**
P. Columnae, Ten. = **P. officinalis** var. **Columnae.**
P. commutata, Schott = **P. villosa** var. **commutata.**
P. confinis, Schott = **P. hirsuta.**
P. cordifolia, Schur. = **P. officinalis** var. **Columnae.**
P. coronaria, Salis. = **P. officinalis.**
* **P. cottia**, Widmer. (Sect. AURICULA-ERYTHRODOSUM.) Cottian Alps.
P. crenata, Fuss = **P. Auricula.**
P. crenata, Lam. = **P. marginata.**
P. crenata, Salzer = **P. elatior** var. **carpathica.**
P. dahurica, Lehmann = **P. farinosa** sub. sp. **davurica** var. **intermedia.**
P. danubialis, Richter = **P. elatior.**
P. daonensis, Leyb. = **P. oenensis.**
P. davurica, Spreng. = **P. farinosa** var. **davurica.**
P. decipiens, Stein non Duby = **P. hirsuta.**
P. decora, Sims = **P. hirsuta.**
* **P. deorum**, Velen. (Sect. AURICULA-CYANOPSIS.) Bulgaria.
P. discolor, Schur. = **P. officinalis** var. **Columnae.**
P. dolomitis, Hort. = **P. Auricula** var. **ciliata.**
P. domestica, Hoffm. = **P. officinalis.**
* **P. elatior** (L.), Hill. (Sect. VERNALES.) Middle Europe.
* var. **carpathica**, Griseb. et Schenk. Carpathians.
* var. **intricata**, Pax. S. European Mountains.
* var. **Pallasii**, Pax. Ural.
P. exaltata, Lehm. = **P. farinosa** sub. sp. **davurica** var. **intermedia.**
P. exigua, Velenovsky = **P. farinosa** sub. sp. **davurica** var. **exigua.**
P. exscapa, Hegetschw. et Heer = **P. hirsuta** var. **exscapa.**
* **P. farinosa**, L. (Sect. FARINOSAE.) Arctic, subarctic, and mountain regions of Northern Temperate Zone (and Andes of South America from Chile to Tierra del Fuego).
* sub. sp. **davurica**, Spreng. Russia and Bulgaria.

See footnote on p. 222.

P. farinosa, Griseb = **P. frondosa.**
P. finnmarchica, Jacq. = **P. sibirica** var. **integrifolia.**
P. Fluggeana, Lehm. = **P. elatior** forma **Perreiniana.**
P. fragrans, Krause = **P. elatior** forma **fragrans.**
P. Freyeri, Hladnik = **P. carniolica.**
* **P. frondosa,** Janka. (Sect. FARINOSAE.) N. Thracia.
P. gigantea, Jacq. = **P. farinosa** sub. sp. **dahurica** var. **intermedia.**
P. glabrescens, F. Nylander = **P. stricta.**
P. glandulosa, Bonjean = **P. pedemontana.**
* **P. glaucescens,** Moretti. (Sect. AURICULA-ARTHRITICA.) S.-E. Vorarlberg.
* sub. sp. **calycina** (Duby), Pax. Bergamasker Alps and Giudicaria.
* sub. sp. **longobarda** (Porta), Widmer. Giudicaria and Bergamasker Alps.
P. glaucescens, Reichb. = **P. spectabilis** and **P. Wulfeniana.**
P. glutinosa, All. = **P. Allionii.**
* **P. glutinosa,** Wulfen. (Sect. AURICULA-CYANOPSIS.) E. Central Alps.
P. grandiflora, Bast. = **P. carniolica.**
P. grandiflora, Lam. = **P. acaulis.**
P. graveolens, Hegetschw. et Heer = **P. viscosa** var. **graveolens.**
* **P. hirsuta,** All. (Sect. AURICULA-ERYTHRODOSUM.) Pyrenees, Central Alps and South Tyrol.
var. **angustata,** Widmer. Rhaetian Alps.
var. **exscapa,** Pax. Mount Javernaz.
* var. **nivea,** Sims. Garden form.
P. hirsuta, Arcangeli = **P. apennina.**
P. hirsuta, Reichb. = **P. villosa** sub. sp. **Jacquini.**
P. hirsuta, Vill. = **P. viscosa.**
P. Hornemanniana, Lehmann = **P. farinosa** var. **Hornemanniana.**
P. hybrida, Schrank = **P. acaulis.**
P. incana, Jones = **P. farinosa** var. **genuina.**
P. incisa, Lam. = **P. integrifolia.**
P. inflata, Duby = **P. officinalis** var. **canescens.**
P. inflata, Lehmann = **P. officinalis** var. **macrocalyx.**
P. inodora, Gilib. = **P. elatior.**
* **P. integrifolia,** L. (Sect. AURICULA-RHOPSIDIUM.) Pyrenees and Central Alps.
P. integrifolia, Oeder = **P. sibirica** var. **integrifolia.**
P. integrifolia, Reichb. = **P. Wulfeniana.**
P. integrifolia, Scopoli = **P. carniolica.**
P. integrifolia, Tausch. = **P. spectabilis.**
P. integrifolia, Vis. = **P. Kitaibeliana.**
P. intermedia, Ledeb. = **P. sibirica** var. **arctica.**
P. intermedia, Sims = **P. farinosa** sub. sp. **davurica** var. **intermedia.**
P. intricata, Godr. et Gren. = **P. elatior** var. **intricata.**
P. intricata, Janka = **P. elatior** var. **carpathica** f. **subarctica.**

* See footnote on p. 222.

P. intrusa, Reichb. = **P. sibirica** var. **integrifolia.**
P. Jellenkiana, Freyer = **P. carniolica.**
* **P. Kitaibeliana,** Schott. (Sect. AURICULA-RHOPSIDIUM.) Illyrian Alps.
P. laevigata, Duby = **P. glaucescens.**
P. latifolia, Lapeyr. = **P. viscosa.**
P. lepida, Duby = **P. farinosa** sub. sp. **davurica** var. **intermedia.**
* **P. leucophylla** var. **longipes**, Pax. (Sect. VERNALES.) E. Carpathians.
P. lilacina, Hort. = **P. acaulis** var. **rubra.**
* **P. longiflora,** All. (Sect. FARINOSAE.) Alps, Carpathians, Bosnia and Bulgaria.
P. longiscapa, Ledeb. = **P. farinosa** sub. sp. **davurica** var. **intermedia.**
P. longobarda, Porta = **P. glaucescens** var. **longobarda.**
P. lutea, Vill. = **P. Auricula.**
P. lutea plena, Hort. = **P. acaulis** form.
P. macrocalyx, Burge = **P. officinalis** var. **macrocalyx.**
P. macrocalyx, Schur = **P. officinalis** var. **canescens.**
* **P. marginata,** Curtis. (Sect. AURICULA-BREVIBRACTEATAE.) Maritime and Cottian Alps.
P. microcalyx, Lehmann = **P. marginata.**
* **P. minima,** Linn. (Sect. AURICULA-CHAMAECALLIS.) Riesengebirge, E. Alps, Carpathians, Bulgaria and Thracia.
P. montana, Opiz = **P. elatior.**
P. montana, Reuter = **P. officinalis.**
P. montana, Schur = **P. elatior** var. **carpathica** f. **subarctica.**
P. multiceps, Freyer = **P. carniolica.**
P. Nelsoni, Hort. = **P. hirsuta.**
P. nivalis, Don = **P. Auricula** var. **ciliata.**
P. nivalis, Turcz. = **P. farinosa.**
P. norvegica, Retz = **P. sibirica** var. **integrifolia.**
P. nutans, Georgi = **P. sibirica** var. **integrifolia.**
P. oblongifolia, Schur = **P. elatior** var. **Benkoiana.**
P. Obristii, Stein = **P. Auricula** var. **Obristii.**
P. odorata, Gilib. = **P. officinalis.**
* **P. oenensis,** Thomas. (Sect. AURICULA-ERYTHRODOSUM.) West Rhaetian Alps.
* **P. officinalis** (L.), Hill. (Sect. VERNALES.) Central Europe.
* var. **macrocalyx,** Koch. E. Prussia, Middle Russia eastwards.
* var. **canescens**, Beck. E. and Mid. Europe.
* var. **Columnae**, Pax. S. Europe.
P. pachyscapa, Goiran = **P. elatior** var. **intricata.**
* **P. Palinuri,** Petagna. (Sect. AURICULA-EUAURICULAE.) Salerno, Italy.
P. Pallasii, Lehmann = **P. elatior** var. **Pallasii.**
P. pallida, Schott = **P. hirsuta.**

* See footnote on p. 222.

P. pannonica, Kerner = **P. officinalis** var. **canescens.**
P. Parlatorei, Caruel = **P. spectabilis.**
* **P. pedemontana,** Thomas. (Sect. AURICULA-ERYTHRODOSUM.) Cottian and Graian Alps.
P. Perreiniana, Flügge = **P. elatior** var. **Perreiniana.**
P. pistillaris, Hoffmannsegg = **P. officinalis.**
P. Plantae, Brügger = **P. oenensis.**
P. Polliniana, Moretti = **P. spectabilis.**
P. Pooliana, Brügger = **P. oenensis.**
P. pubescens, Loisel. = **P. hirsuta.**
P. pubescens, Reichb. = **P. pedemontana.**
P. purpurea, Hort. = **P. acaulis** var. **rubra.**
P. pyrenaica, Miègeville = **P. officinalis** var. **Columnae.**
P. rosea, Hort. (non Royle) = **P. acaulis** var. **rubra.**
P. rotundifolia, Pallas = **P. sibirica** var. **integrifolia.**
P. Sauteri, Schultz = **P. minima.**
P. scotica, W. J. Hook. = **P. farinosa.**
P. sibirica var. **integrifolia,** Pax. (Sect. FARINOSAE.) Arctic Europe.
var. **arctica,** Pax. Russia, Lapland, N. Russia.
P. Sibthorpii, Hoffmannsegg = **P. acaulis** var. **rubra.**
P. similis, Stein = **P. Auricula** var. **Obristii.**
P. Simsii, Sweet = **P. villosa** var. **Jacquinii.**
P. spectabilis, Josch = **P. Wulfeniana.**
P. spectabilis, Mert. et Koch = **P. Clusiana.**
* **P. spectabilis**, Tratt. (Sect. AURICULA-ERYTHRODOSUM.) Giudicaria and Veronese Alps.
P. stelviana, Vulp. = **P. oenensis.**
* **P. stricta,** Hornem. (Sect. FARINOSAE.) Norway, N. Sweden, Lapland, N. Russia.
P. suaveolens, Bertol. = **P. officinalis** var. **Columnae.**
P. suaveolens, Radde = **P. officinalis** var. **macrocalyx** form.
P. subarctica, Schur = **P. elatior** var. **carpathica** f. **subarctica.**
P. sylvestris, Scop. = **P. acaulis.**
* **P. tyrolensis**, Schott. (Sect. AURICULA-RHOPSIDIUM.) S. Tyrol.
P. undulata, Fisch. = **P. farinosa** sub. sp. **davurica** var. **intermedia.**
P. uniflora, Gmel. = **P. acaulis.**
P. uralensis, Fisch. = **P. officinalis** var. **macrocalyx.**
P. veris, L. = **P. officinalis.**
P. veris, Oeder = **P. elatior.**
P. vernalis, Salisb. = **P. acaulis.**
P. villosa, Curtis = **P. hirsuta.**
* **P. villosa**, Jacq. (Sect. AURICULA-ERYTHRODOSUM.) E. Alps.
* sub. sp. **Jacquinii.** E. Alps.
sub. sp. **commutata.** Steiermark.
P. villosa, Parl. = **P. cottia.**
* **P. viscosa,** All. (Sect. AURICULA-BREVIBRACTEATAE.) E. Pyrenees. W. and Rhaetian Alps.

See footnote on p. 222.

P. viscosa, Vill. = **P. hirsuta.**
P. viscosa, Waldst. et Kit. = **P. Kitaibeliana.**
P. vulgaris, Hudson = **P. acaulis.**
P. Warei, Stein = **P. farinosa.**
* **P. Wulfeniana**, Schott. (Sect. AURICULA-ARTHRITICA.) E. Alps.

Primula × **Bowlesii**, Farrer. [hyb. nov.]

Primula × **Bowlesii**, Farrer. (*P. pedemontana*, Thomas × *P. viscosa*, All.) Stirps hybrida, inter parentes intermedia.

Habitus potius *P. pedemontanae*, folia tamen glandulis densius vestita, longiora, ac rufo colore parcius praedita, in petiolum sensim vel subito attenuata, et ad apices ± dentata. Scapus longior quam in *P. pedemontana*, omnino glandulis ecoloratis sertum, ad anthesin duplo vel plus duplo folia superans, umbellam secundiorem gerens, parcius saepe floribus praeditis quam parentes. Pedicelli longiores, dense glandulis vestiti. Calycis lobi breviores incurvi, saepius colore purpurascente, formam *P. viscosae* approximantes, nec tamen rugis *P. pedemontanae* carentes. Corollae purpureae, inter parentes ambiguae, sed saepius apertiores quam in *P. viscosa*, *P. viscosae* tamen tubo dense extus colorato munitae. Faux angustior, farina parcissime praedita.

A *P. pedemontana*, statura saepius majore, foliis superficie dense glandulosis, scapo umbellam secundifloram gerente differt, a *P. viscosa* statura minore, floribus apertioribus, foliis pedicellisque glandulis ± rufescentibus ornatis.

Habitat: Little Mont Cenis, occurring sparsely among the parents, from near the frontier towards Col de Clapier. Middle to end of June. In cultivation. Introduced by Messrs. Farrer and Bowles, 1911.

* See footnote on p. 222.

EXAMINATIONS IN HORTICULTURE, 1913.

EXAMINATION OF EMPLOYEES IN PUBLIC PARKS.

January 6, 1913.

The Royal Horticultural Society's Eighth Examination of Employees in Public Parks was held on January 6, 1913.

As previously, the examination was partly viva voce and partly written, occupying three hours and twenty minutes. It was held at the Society's Hall in Vincent Square, Westminster.

Thirty-four candidates entered, and of these 10 secured places in the first class, 14 in the second, and 6 in the third, leaving 4 who failed to satisfy the minimum requirements of the examiners.

The examiners report that the answers in the viva voce section were, generally, above the average, but the written answers show no very marked improvement on those of past years. Some of the candidates were weak in a knowledge of the functions of roots and leaves. Question 3, on the drainage of heavy soils, was well answered, but that on the manuring of lawns and of different types of land, and the action of lime upon soils and plant foods, required a more scientific knowledge and was not well answered. The study of artificial manures is important, and candidates should familiarize themselves with their uses, especially as an adjunct to farmyard manure, and should be acquainted with the quantities of each to be used.

There was a surprising ignorance concerning the *utility* of bastard trenching, and of the labour required for a specified area; and it was not a little disappointing to find only the oldest and commonest trees and shrubs mentioned in the answers to 11 and 12, whereas so many excellent new varieties are now to be found in public parks. Five candidates omitted to answer the obligatory question No. 13, for which omission a certain number of marks was deducted by the examiners.

The impression left upon the minds of the examiners, after the papers were marked, was that the information given showed but a fragmentary knowledge, uncertain and lacking in conviction, instead of an exhaustive mastership of the subjects of the questions. Public parks gardeners are urged to recognize the value to themselves of a full and complete information, and of the knowledge born of the practical application of such information in their work. This is not to be gained by a month or two's book-reading before the examination, but by continual and persevering application to work and study and observation throughout the twelve months.

The attention of the first-class candidates is called to the Society's

General Examination, which it is hoped they will prepare for, as inviting a higher standard of gardening ability.

Examiners: C. R. Fielder. Owen Thomas. John W. Odell. W. Crump. Edward White. W. Wilks.

Class I.

1. J. F. Goaman, Hawthorns, Ashurst Road, North Finchley.
2. W. Power, 70 Bonner Road, Victoria Park.
2. G. J. Rule, 4 Darley Road, Wandsworth Common.
4. H. W. Mouser, 4 Lauderdale House, Waterlow Park.
5. T. F. Gilbert, 7 Hansler Road, East Dulwich.
6. W. Cooper, 2 Andrews Villas, Underhill Road, S.E.
6. J. F. Lee, R.H.S. Gardens, Wisley, Surrey.
8. H. Dorrell, 327 Crystal Palace Road, East Dulwich.
8. F. Rowling, 43 Mount Ash Road, Sydenham.
10. G. Miller, 111 Goodrich Road, East Dulwich.

Class II.

1. T. Cooper, 4 Manor Park Road, East Finchley.
2. J. Coombes, 87 Kilmorie Road, Forest Hill.
2. G. G. Olliver, 21 Crebor Street, East Dulwich.
4. E. J. Stewart, 27 North Road, Highgate.
5. J. Curl, 34 Kemerton Road, Loughborough Junction.
6. P. Church, 99 Blackstock Road, Finsbury Park.
7. W. Poyser, 72 Burgoyne Road, Harringay.
7. R. Streatfield, 32 Coombe Road, Upper Sydenham.
7. J. W. Webb, 2 Flat, 5 Queen's Sq., Queen's Road, Battersea.
10. H. Cotton, 22 Rignold Road, Camberwell.
11. A. R. Roach, 9 Stoke Newington Common, Stamford Hill.
12. C. Cruse, 140 Landells Road, East Dulwich.
13. C. F. Free, 42 Dixon Street, Salmon's Lane, Limehouse.
14. F. Cobbold, 246 Crystal Palace Road, Dulwich.

Class III.

1. G. Ottley, 4 Thorpe Road, Stamford Hill.
2. C. T. Harris, 267 Deptford Lower Road, S.E.
3. W. Wills, 27 Caxton Road, South Wimbledon.
4. A. Read, 227 Dunstan's Road, East Dulwich.
5. H. W. Veaser, 55 Broomwood Road, Wandsworth Common.
6. G. W. Allchin, 106 Castle Street, Battersea.

GENERAL EXAMINATION,

Wednesday, April 2, 1913.

Seniors: 18 years of age and over.

Two hundred and twenty-two candidates entered for the Society's Senior General Examination, held on April 2, 1913. Eight of these, however, did not present themselves on the date appointed.

The Examiners, the Rev. Prof. G. Henslow, M.A., V.M.H., and Mr. James Hudson, V.M.H., report that of the Senior candidates obtaining a place in the Pass List, only 8, or about 4 per cent., were considered worthy of being placed in the first class; 78, or 38 per cent., in the second class; and 116, or 49 per cent., in the third class. Twelve candidates failed to secure sufficient marks to appear in the Pass List at all.

With regard to the answers, those of the candidates placed first in the list were extremely good, securing marks very little short of the maximum.

The answers of many other candidates showed marked ability, both in practical work and in reasoning powers. Too much reliance upon text-books was shown by some. Books, be they ever so good, cannot always supply material for a satisfactory reply. Better answers, as a rule, were given in relation to fruit and vegetable cultivation than in other subjects. Several replies, too, on orchid question (No. 15) were excellent.

A few points, almost invariably omitted or unknown, may be mentioned. A specially important function of bulbs, corms, &c., is not *solely* for storage of "food," but to retain water for times of drought.

The main use of heat in respiration is the liberation of *energy* for all vital processes. The "injuriousness" of green glass is due to the fact that it absorbs all the main coloured rays of light required, while green itself is *not* absorbed to any extent by leaves, red and violet being most important for transpiration, and yellow and blue for assimilation.

Some candidates did not carefully read the questions before giving their answers; in consequence they departed from what was expected of them, with a resultant waste of time. Candidates should practise beforehand upon questions previously set, and thus test their ability, and also the time at their disposal.

JUNIORS: under 18 years of age.

One hundred and thirty-nine candidates entered for the Junior Section of the General Examination.

The Pass List shows only 2 candidates, or less than 2 per cent., to have obtained a first class; 5, or about 3½ per cent., a second class; 69, or about 50 per cent., a third class; and 49, about 35 per cent., a fourth class.

The Examiners report:—Taken as a whole, we think that the candidates have done better this year. Many gave distinctly good replies, but the proportion of those in the lower classes is lamentably great in comparison with those in classes 1 and 2. There was an evident lack of thorough preparation, and those under whom the Juniors are studying should be asked to give them the maximum amount of attention possible as the subject is one of great importance in their pupils' future careers in one way or another.

The Examiners say that greater care must be taken, especially by the Juniors, *not* to mix Section "B" papers with Section "A," or the reverse, thereby causing the Examiners much unnecessary trouble. The candidates should carefully examine the sheets *after* fastening them together to see that their answers are correctly numbered to correspond with the questions; and that a fresh sheet of paper has been used for each separate question answered. This is very important.

W. WILKS, *Secretary.*

SENIORS.

Class I.

1. Ramsbottom, J. K., R.H.S. Gardens, Wisley.
2. Mitcheson, G. G., Studley College, Warwickshire.
   Simmins, G. E., Studley College, Warwickshire.
   Warburg, W., Horticultural College, Swanley.
5. Rippiner, G., King's Road, Rushden, Northampton.
6. Howells, D., 6 Custom House Street, Aberystwyth.
   Machin, A., 48 Frances Road, Windsor.
   Pankhurst, A. C. M., Studley College, Warwickshire.

Class II.

1. West, M., Clee St. Margaret, Craven Arms, Salop.

2. Edelstein, G. A., Thatcham Fruit and Flower Farm, Newbury.
Fawssett, E. B., Studley College, Warwickshire.
Lea, G. R., Howsham Hall Gardens, Barton-le-Willows.
Lewis, C., 78 Plymouth Road, Penarth.
Moyse, W., School House, Crowan, Praze, Cornwall.
Pardy, A., Glenluce, Forteath Avenue, Elgin.
Rotherham, M. E., Studley College, Warwickshire.
Tribe, H., 1 Turner Road, Lee, S.E.

10. Bassett, G. B., R.H.S. Gardens, Wisley.
Booth, T. W., Joyce Grove Gardens, Nettlebed, Henley-on-Thames.
King, G. D., Thatcham Fruit and Flower Farm, Newbury.
Mackenzie, A. D., St. Andrew's Hall, Reading.
Merryweather, M. E., Horticultural College, Swanley.
Nightingale, E. M., Horticultural College, Swanley.
Pearson, C., Studley College, Warwickshire.
Rowlands, J., 13 Ravenscliffe Road, Kidsgrove, Stoke-on-Trent.
Russell, J. T., Garden Cottage, Hawthorn Villa, Harton, South Shields.
Taylor, D. B., Horticultural College, Swanley.
Thomas, E. L. P., R.H.S. Gardens, Wisley.
Walsh, R. H., Ferndale, Walshaw Road, Elton, Bury, Lancs.

22. Bell, M. T., 7A St. Ann's Terrace, Barnes, S.W.
Boyd, H., The Gardens, Witton Park, Blackburn.
Bratherton, T., 19 Woodford Road, Watford, Herts.
Brunton, H. H., Swainley, Northallerton, Yorks.
Dowding, E., Studley College, Warwickshire.
Fairclough, C., Church Street, Gawber, Barnsley, Yorks.
Freyburg, F. J., 1 The Pavement, Hersham Road, Walton-on-Thames.
Goodman, R., The Gardens, Motcombe, Shaftesbury.
Twinney, M. M., 11 Donald Street, Roath Park, Cardiff.

31. Aylett, R. M., 20 Faversham Road, Catford, S.E.
Baker, F., 10 Arabella Street, Roath Park, Cardiff.
Bright, G., 169 Castleford Road, Normanton, Yorks.
Butterworth, K. M. C., Priory Close, Cartmel, Grange-over-Sands, N. Lancs.
Crane, M. B., 2 Watery Lane, Merton Park, S.W.
Dobson, J., The Cottage, Manor Way, Blackheath, S.E.
Ely, G., The Nunnery Gardens, Douglas, Isle of Man.
Evans, B. M. M., Studley College, Warwickshire.
Heard, J. W., 8 Peter Street, Yeovil, Somerset.
James, A. B., Studley College, Warwickshire.
Pritchard, J. O., R.H.S. Gardens, Wisley.

Desai, M. G., Ivy House, Woolsthorpe, Grantham.
Diodati, M., Horticultural College, Swanley.
Gilbert, G., Horticultural College, Swanley.
42. Gough, J. C., 5 Kendrick Road, Reading.
Harris, C., Corona Villa, Grayshott, Haslemere.
Knowlman, K. M., 7 West Hill, Highgate, N.
Roger, R. V., St. Ives, Hay Green Lane, Selly Oak, Birmingham.

Darby, N. J., 25 Russell Street, Reading.
Galbraith, G. E., Studley College, Warwickshire.
49. Lister, M. A., The Gardens, Ossington, Newark-on-Trent.
Phillips, E., 5 Pontygwindy Road, Caerphilly, Cardiff.
Sutton, H., Foston Hall Gardens, Derby.

Armstrong, J. T., Thatcham Fruit and Flower Farm, Newbury.
54. Goaman, J. F., Hawthorns, Ashurst Road, N. Finchley.
James, V. G., 21 Victoria Terrace, Cwmavon, Port Talbot.
Moubray, B. C., St. James' Gardens, West Malvern.

Allan, W. H., 14 Melville Terrace, Edinburgh.
Bushill, M., Arlesey House, Hitchin, Herts.
Card, A., Godinton Gardens, Ashford, Kent.
Fuller, E. W., The Gardens, Henham Hall, Wangford, Suffolk.
58. Harrison, J., Ribby Hall Gardens, Kirkham, Lancs.
Mead, A. L., Leicester Frith, Groby Road, Leicester.
Olley, J., The Cottage, Checkendon Court, Reading.
Raley, H. F., Woodcroft, Sandal, Wakefield, Yorks.
Sayers, F. E., near Worplesdon Station, Guildford.
Wight, A., The Gardens, Daisy Bank, Bradford.

Ashby, P. N., R.H.S. Gardens, Wisley.
Baldry, F., 58 Clarkson Street, Ipswich.
Cooper, J. C., 37 Old Fillebrook Road, Leytonstone.
Daniels, C. W., R.H.S. Gardens, Wisley.
Farrand, J., 1 Norman Road, Stalybridge, Cheshire.
68. Gibbs, E. W., Fern Bank, New Mills, Stockport.
Giblett, H. J., Hurstbourn Park, Whitchurch, Hants.
Harrison, R. G., Lows Hill Garden, Hoe Benham, Newbury.
Nicholson, D. E., R.H.S. Gardens, Wisley.
Roberts, D. B., Horticultural College, Swanley.
Watson, M. R., Romano, Corstorphine, Midlothian.

Class III.

Barnes, A. E., 4 West Hill, Reading.
Bassett, R. W., R.H.S. Gardens, Wisley.
Cobbold, M. T., Benskins, Westfield, Sussex.
Copley, G. H., 37 Sowden Street, Great Horton, Bradford.
1. Dickson, A., R.H.S. Gardens, Wisley.
Eves, B. A., 56 Archway Street, Barnes, S.W.
Gray, O., The Gardens, Barton Manor, Buckingham.
Harvey, H. D., School House, Blundeston, Lowestoft.

Hutchinson, N., Thatcham Fruit and Flower Farm, Newbury.
Lord, S. J., Shawbury, Shustoke, Birmingham.
1. Pendred, G. W., 132 Freshfield Road, Brighton.
Preston, K. M., R.H.S. Gardens, Wisley.
Wilson, G. F., R.H.S. Gardens, Wisley.
Barnard, B. H., Letheringsett School of Gardening, Holt, Norfolk.
Cox, H. J., Broad Lane, Fillongley, Coventry.
Fotheringham, A., Horticultural College, Swanley.
Gates, A. H., 13 Franklin Road, Portslade, Sussex.
Grout, G., 3 Forest View, Cheapside, Ascot.
Jackson, R. W., Horticultural College, Swanley.
14. Johns, C. W., Corner House, Trull, Taunton.
Knee, W. H., 4 Naunton Villas, Naunton Park, Cheltenham.
Lowry, C. H., Dales Green, Harrisea Head, Stoke-on-Trent.
Mayne, W. E., 23 Hirwain Street, Cathays, Cardiff.
Millen, A. H., Osney Lodge, S. Godstone, Surrey.
Newson, W. H., Broome Place Gardens, Bungay, Norfolk.
Read, H. S., Hawthornden, Garland Road, Poole, Dorset.
Stephenson, J. F., The Lodge, Temple Bank, Bradford.
Berg, A. H., R.H.S. Gardens, Wisley.
Booth, S. W., Wilbarston, Market Harborough.
Cheshire, E. C., R.H.S. Gardens, Wisley.
Colledge, J., 5 The Cedars, Sunderland.
Davies, J. T., 6 Ashford Carbonell, Ludlow, Shropshire.
28. Divers, J., 52 Dancer Road, Richmond, Surrey.
Forsyth, H. G., R.H.S. Gardens, Wisley.
Handy, A., 35 Sunderland Road, Maningham, Bradford.
Henry, D. G., 3 Meadowbank Crescent, Edinburgh.
Knights, C., The Gardens, Brandon Park, Suffolk.
Ramsbotham, F., 1 Rosebery Crescent, Edinburgh.
Coles, F. S., 4 Shrubbery Road, Weston-super-Mare.
Keable, M. L., 2 Elder Avenue, Crouch End, N.
39. Lukehurst, J., 47 Medfield Street, Roehampton, S.W.
Sanderson, J. J., 39 Station Road, Hetton-le-Hole, Durham.
Telfer, A. E. C., Anlaby House, Newry Street, Holyhead.
Ashford, L. B., Halcyon Club, 14 Cork Street, W.
Chandler, A. S., Royal Victoria Patriotic School, Wandsworth Common, S.W.
Cooke, R., Willoughton, Lincoln.
Henderson, G. S., 4 High Street, Penicuik, Midlothian.
44. Hough, R. V., 3 Margaretting Road, Manor Park, E.
Irvin, J. G., 12 Manor Road, Leyton, E.
McHardy, E. M., Letheringsett School of Gardening, Holt, Norfolk.
Norman, D., Thatcham Fruit and Flower Farm, Newbury.
Underwood, J. R., Billesdon, Leicester.

Bradley, C. M., East Anglian Inst. of Agric., Chelmsford.
Brett, F. D., 92 Park Street, Thame, Oxon.
Catling, C., Bayfordbury Gardens, Hertford.
Jones, O. R., 3 Moriah Terrace, Carnarvon.
Morris, G., 18 Bryn Ffynon Road, Port Dinorwic, N. Wales.
53. Partridge, C. E., 4 Dalkeith Street, Joppa, Edinburgh.
Rawes, A. N., R.H.S. Gardens, Wisley.
Roberts, H., Aelybryn, Cellan, Lampeter, S. Wales.
Roodhouse, A. T., Blissford View, Blissford, Fordingbridge.
Thomas, I. W., Miners' Arms, Rhandirmwyn, Llandovery, S. Wales.
Wills, E., Fircroft, Bournville, Birmingham.

Benn, W., Johnson Street, Mirfield, Yorks.
Corbett, G., Hillingdon Court Gardens, Uxbridge.
Ellacott, W. J., The Gardens, North Mymms Park, Hatfield,
64. Herts.
Spalding, A., Nona Cottage, Barry, Carnoustie, Forfar.
Tempest, E., Thatcham Fruit and Flower Farm, Newbury.
Walker, L., 59 Myland Road, Colchester.

Anderson, D., 281 Dalkeith Road, Edinburgh.
Claxton, F. G., The Gardens, Downham Hall, Brandon, Suffolk.
FitzGerald, D., Thatcham Fruit and Flower Farm, Newbury.
Schmidt, I. L., Chesneys, Eynsham, Oxon.
70. Tindall, H. B. A., 36 Alexandra Road, Richmond, Surrey.
Watson, G. W., Kilwinning, Park Farm Road, Kingston-on-
Thames.
Wright, M., 59 Winsham Grove, Clapham Common, S.W.

Chilcott, O. C., 1 Acris Street, Wandsworth, S.W.
Clements, H., Arnside, Bennetts Hill, Dudley.
Hamilton, J., Altona, Catherine Street, Motherwell, N.B.
77. Hartley, S., 182 Edmund Street West, Rochdale, Lancs.
Parsons, D. C., Norton Boys' Home, Bordesley Green, Birm-
ingham.

Badger, R., Carnethy, Penicuik, Midlothian.
Hayward, H. G., R.H.S. Gardens, Wisley.
Knight, S. A., Horticultural College, Swanley.
82. Powers, T., 11 Newton Place, Soho, Birmingham.
Shrigley, W. C., Cliffe View Nurseries, Cross Roads, Keighley,
Yorks.

87. Nixon, H., Rydal Mount, Alexandra Road, Parkstone, Dorset.

Boulton, F., 25 Duckett Road, Harringay, N.
Caney, H. J., R.H.S. Gardens, Wisley.
Collett, D. P., Higham, Tatnam Road, Poole, Dorset.
Collins, W. H., Railton Cottages, High Street, St. Mary's Cray,
88. Kent.

Hyman, K., 20 Colvestone Crescent, Dalston, N.E.
Melles, A. B., Botanic Gardens, Cambridge.
Scase, M. P., R.H.S. Gardens, Wisley.
Zabell, V. M., St. George's Hostel, University College, Reading.

96. Ashurst, G. H., 4 St. Andrew Street, Ayr, N.B.
Bosomworth, H., 22 Sycamore Terrace, York.
Gunston, H. D., School House, Long Ashton, Bristol.
Haigh, A. R. W., Lartington Hall, Darlington.
Purdon, J., The Gardens, Ashorne Hill, Leamington.
Stanley, H. D., School House, Staplehurst, Kent.
Wood, J. G., R.H.S. Gardens, Wisley.

103. Masters, A., Bayford Grange Gardens, Bayford, Hertford.

104. Bullen, G., R.H.S. Gardens, Wisley.
Dix, R. J., R.H.S. Gardens, Wisley.
Inch, W., 6 Langholm Crescent, Darlington.
Peters, R. W., 2 Watery Lane, Merton Rush, Merton Park, S.W.

108. Burt, V. M., Waterside, Devoran, Cornwall.

109. Moir, J. A., 1 The Poplars, Crescent Road, Bognor, Sussex.

110. Weed, W., 3 Siglan Terrace, Llanfairpwll, Anglesey.

111. George, D., Thatcham Fruit and Flower Farm, Newbury.
Mallinson, R. H., Oakland, Windermere, Westmoreland.
Whitton, C. A., Darneleigh, South Darenth, Kent.

114. Boylett, W. H., 74 Mysore Road, Clapham Common, S.W.
Forbes, W., The Stoops, Rainhill, Lancs.
O'Neill, S. J., Fairymount National School, Crettyard, Carlow, Ireland.

JUNIORS.

Class I.

1. Cale, G. J. L., 6 Dalcross Street, Roath Park, Cardiff.
2. Ainger, W., East Anglian Institute of Agriculture, Chelmsford.

Class II.

1. Arnold, G. J., 206 Victoria Road, Old Charlton, Kent.
2. Church, J., East Anglian Institute of Agriculture, Chelmsford.
3. Horscroft, G., East Anglian Inst. of Agric., Chelmsford.
4. Last, S., East Anglian Institute of Agriculture, Chelmsford.
5. Williams, C. R., Lostock Industrial School, Bolton.

Class III.

1. Greenway, P. J., East Anglian Inst. of Agric., Chelmsford.
Jones, J. J., Bryn Eira, Llanfairpwll, Anglesey.
Treseder, A. R., 540 Cowbridge Road, Canton, Cardiff.
Tunmer, W. G., East Anglian Inst. of Agric., Chelmsford.

5. Slatter, H., Leeds Reformatory, Adel, Leeds.
Smith, W. G., Stoke Farm School, Bromsgrove.

7. Adams, E. W., Stoke Farm School, Bromsgrove.
Topliss, J. H., Lostock Industrial School, Bolton.

9. Fayers, T. F. R., Kerrison School, Thorndon, Eye.
Robinson, R. D., 105 Shortlands Road, Kingston-on-Thames.
Schofield, G. D., Lostock Industrial School, Bolton.

12. Baker, E. E., The Forge, Waresley, near Sandy, Beds.
Brown, W., Lostock Industrial School, Bolton.
Gregory, C., 34 Leabourne Road, Stamford Hill, N.

15. Kemp, J. H., Leeds Reformatory, Adel, Leeds.
Lewis, P. D., Kerrison School, Thorndon, Eye.
Musgrove, J., Fylde Farm School, Poulton-le-Fylde, Lancs.

18. Best, G. A., 8 Sycamore Road, Bournville, Birmingham.
Carter, H., Fylde Farm School, Poulton-le-Fylde.
Felton, R. M., East Anglian Institute of Agriculture, Chelmsford.
Hope, H., Lostock Industrial School, Bolton.
Spurgin, F., Kerrison School, Thorndon, Eye.

23. Giles, J., Stoke Farm School, near Bromsgrove.
Hudson, C. E., Ingleholme, Bishopswood Road, Highgate.
Thomas, A. I., 10 Deri Road, Pen-y-lan, Cardiff.
Tiplady, A., Lostock Industrial School, Bolton.

27. Palmer, G. E., Stoke Farm School, near Bromsgrove.

28. Abel, W., Somerset Industrial School, Bath.
Jones, M. W., East Anglian Institute of Agriculture, Chelmsford.
Loom, A. G., Stoke Farm School, near Bromsgrove.

31. Edge, J., Lostock Industrial School, Bolton.
Johnson, W. H., Lostock Industrial School, Bolton.
Thompson, F., Fylde Farm School, Poulton-le-Fylde.
Walker, W., Stoke Farm School, Bromsgrove.
Williams, W. H., Voelgraig, Llanfairpwll, Anglesey.

36. Saunders, J., Liverpool Farm School, Newton-le-Willows.
Selwood, F., Lostock Industrial School, Bolton.
Smith, A. R., Stoke Farm School, near Bromsgrove.

39. Bayton, A., Buxton Industrial School, Norwich.
Goodman, H. M., Fylde Farm School, Poulton-le-Fylde.
Mogford, E. W., Kerrison School, Thorndon, Eye.
Parkinson, C., Lostock Industrial School, Bolton.

43. Ashby, I. L., East Anglian Institute of Agriculture, Chelmsford.
Downes, J., Kerrison School, Thorndon, Eye.
Mayle, J. G., Kerrison School, Thorndon, Eye.
Warren, F. H., Leeds Reformatory, Adel, near Leeds.

47. Knights, C., Buxton Industrial School, Norwich.
Parkinson, J., Lostock Industrial School, Bolton.
Quinton, C. H., Kerrison School, Thorndon, Eye.
Woodburn, T., Liverpool Farm School, Newton-le-Willows.

51. Anderson, R. A., Stoke Farm School, Bromsgrove.
Folke, L. W., Kerrison School, Thorndon, Eye.
Jakes, A., Kerrison School, Thorndon, Eye.
Lappage, M., Acacia House, Harmondsworth, Middlesex.
Lilwall, L., Lostock Industrial School, Bolton.
Matthews, W. J., Somerset Industrial School, Bath.
Nixon, H., Fylde Farm School, Poulton-le-Fylde, Lancs.
Ratcliffe, J., Monmouthshire Reformatory, Little Mill, Pontypool.
Thorpe, J. S., Liverpool Farm School, Newton-le-Willows.
Waller, H., Stoke Farm School, Bromsgrove.

61. Gibbons, R. C., Buxton Industrial School, Norwich.
Lane, A., Monmouthshire Reformatory, Little Mill, Pontypool.
Matthews, H. R., Liverpool Farm School, Newton-le-Willows.

64. Ayling, F. A., Kerrison School, Thorndon, Eye.
Butterworth, C., Leeds Reformatory, Adel, Leeds.
Griffin, D. C., White Oak School, Swanley.
Sawyer, W., Kerrison School, Thorndon, Eye.

68. Skinner, F. J., Duke Street, Padstow, Cornwall.
Smith, J., White Oak School, Swanley.

Class IV.

1. Cullimore, E., White Oak School, Swanley.
Davidson, W. R., Reformatory School, Stranraer.
Farminer, A., Kerrison School, Thorndon, Eye.
Lappage, D. V., Horticultural Training College, Harmondsworth, Middlesex.
McAuley, W., Somerset Industrial School, Bath.
Shrimpton, A., Somerset Industrial School, Bath.
Wiffen, E. J., Kerrison School, Thorndon, Eye.
Willington, H., Kerrison School, Thorndon, Eye.

9. Cook, J. W., Kerrison School, Thorndon, Eye.
Goodwin, G. M., Liverpool Farm School, Newton-le-Willows.
Harries, E. A. K., The Manse, Aberavon, Port Talbot.
Helmore, W. C., Kerrison School, Thorndon, Eye.
Jackson, W., Somerset Industrial School, Bath.
Manktelow, J., White Oak School, Swanley.
Pautard, P. E., White Oak School, Swanley.

16. Blewitt, G. E., Kerrison School, Thorndon, Eye.
Brueford, J. R., Somerset Industrial School, Bath.
Cox, T., Monmouthshire Reformatory, Little Mill, Pontypool.
Higgs, B., White Oak School, Swanley.
Semmens, A., White Oak School, Swanley.

21. Atkin, P. M., 24 Stalbridge Avenue, Sefton Park, Liverpool.
Cook, C., Somerset Industrial School, Bath.
Davenport, J., Kerrison School, Thorndon, Eye.
Hammond, A., Monmouthshire Reformatory, Little Mill, Pontypool.
Hendy, C., St. Vincent's School, Dartford.
Jordan, W., Reformatory School, Stranraer.
Kersley, V. E., Horticultural Training College, Harmondsworth, Middlesex.
Newland, F., Monmouthshire Reformatory, Little Mill, Pontypool.
Robertson, F., Oakbank Industrial School, Aberdeen.
Wimpory, C., White Oak School, Swanley.

31. Brooks, A., Leeds Reformatory, Adel, Leeds.
Grist, W., St. Vincent's School, Dartford.
Wilson, A., Monmouthshire Reformatory, Little Mill, Pontypool.

34. Kellock, A. S., Reformatory School, Stranraer.
Rowe, E., Monmouthshire Reformatory, Little Mill, Pontypool.

36. Hay, R., Reformatory School, Stranraer.
Knight, A., Reformatory School, Stranraer.
Luck, C., St. Vincent's School, Dartford.
Thomas, J. H., Somerset Industrial School, Bath.
Williams, J., St. Vincent's School, Dartford.

41. Auld, J., Reformatory School, Stranraer.
Curtis, R. H., Monmouthshire Reformatory, Little Mill, Pontypool.
Hannant, J., Leeds Reformatory, Adel, Leeds.
Holland, A., Kerrison School, Thorndon, Eye.
Rogers, W., White Oak School, Swanley.
Rossell, E. W., Fylde Farm School, Poulton-le-Fylde, Lancs.
Tite, L. J., Buxton Industrial School, Norwich.
Wilson, T., Reformatory School, Stranraer.

49. Hunt, J. A., Somerset Industrial School, Bath.

BOOK REVIEWS.

"The Genus Iris." By W. R. Dykes. Fol., 245 pp., 48 coloured plates. (University Press, Cambridge.) 6 guineas net.

This monograph has been looked forward to for some time, and expectation will not be disappointed. A few months ago Mr. Dykes published an admirable little book on Irises in the "Present-Day Gardening" series, which gave a deal of information in a compact and inexpensive form, and at the same time showed him to be excellently equipped with knowledge and personal experience for this larger task. Indeed the only complaint that can be made of the sumptuous volume before us is as to its price. All gardeners who have an affection for the Iris will wish to possess it, and it is to be hoped that many, beyond whose purse it lies, will have access to it, in order that this wonderfully various genus may become as widely known as the author would wish. Many good gardens can show but a very limited selection of Irises, while those who grow few beyond *I. germanica* are often heard to complain that their irises are "so soon over," whereas, without attempting the more difficult kinds, such as those of the *Oncocyclus*, and Californian sections, it is easily possible to have irises in flower in the open for at least eight months of the year. The book is indeed a happy combination of scientific investigation and practical information. The author, following in the footsteps of the late Sir Michael Foster (*magnum et venerabile nomen* for all lovers of Irises), has proceeded on the very rational assumption that the best way to know the genus is to grow it. Hence, though he has made the fullest possible use of all available herbarium material, he has, whenever feasible, verified everything by observation of the actual life of the plants. To this end he has himself formed a truly remarkable collection, and it is a striking fact that all the plates, save one, were drawn from plants flowered in the open in the author's own garden.

The gardener will find clear and careful suggestions in the chapter on Cultivation, in the sections at the end of the book on hybridizing and on growing from seed, and at the end of the description of each species. Certain time-honoured heresies about Irises die hard, but it is to be hoped that they are moribund and that Mr. Dykes' authority will help to kill them: *e.g.*, it is still believed by many that autumn is the time for transplantation, that the leaves of "German" irises should be trimmed off short when the beds are tidied up, and that Irises in general are lovers of damp, if not of shade. Presumably this last belief comes from putting together the facts that of the two English species *I. Pseudacorus* is a water-lover and *I. foetidissima* is often

found in woods. In this connexion attention may be called to Mr. Dykes' curious test of habitat: any Iris whose leaves, on being held up to the light, show small black spots, is a water-lover. On diseases and their treatment there is a short and lucid statement: most noteworthy under this head is the treatment recommended for the "rot" which was so prevalent in English gardens a few years ago, more especially as the obvious remedy of liming the soil is probably the worst thing that can be done. It will perhaps be news to some that most irises arrive from seed so quickly at flowering size: eighteen months from the time of germination is given as a long enough period for many bearded and beardless kinds, while a remarkable instance is given of an *I. pumila* whose seeds germinated in spring and produced plants which flowered the same autumn.

Naturally such notes occupy but a small proportion of the text, but, while the description of each species and subspecies includes an exhaustive account of its distribution and introduction, with full diagnosis (in Latin) and botanical description, matters which the unbotanical gardener will perhaps pass over lightly, in most cases some "observations" are added which are full of various interesting details for the unlearned, with not a few acute inferences and conjectures. As an instance may be mentioned the suggestion that *I. albicans* owes its introduction to Europe to the Mohammedan invasion, since this plant was apparently planted regularly in the cemeteries of the faithful: in that case it is probably of Arabian origin and most likely an albino form of the blue Arabian iris known as *I. Madonna*.

Doubtless the most important scientific feature of the book is to be found in the enormous advance which it makes towards a satisfactory classification of the genus. Mr. Dykes has with infinite patience worked through the bewildering mass of synonyms; he has studied each plant in its relation to its geographical distribution; he has, in a very large majority of cases, grown it himself, and seeded it; and has made careful studies under the microscope, extending to the pollen grains.

The result is in general a great simplification of the current nomenclature, most of which of course rests on no authority. At the same time the author is sometimes wisely content to draw provisional lines: he has the caution of the really scientific mind. Here are some of his results, which should be of interest to others besides professed botanists:

I. orientalis is distinguished from *I. sibirica*: many of the best forms seen in gardens are crosses between the two, in which the distinctive characters are blended. The *spuria* group is greatly simplified, and we may part, without much regret, with such a name as *Guldenstädtiana*; it is even suggested that the three superb yellow beardless flags known as *ochroleuca*, *Monnieri*, and *aurea* are subspecies of *spuria*: incidentally we learn that the Cretan origin of *Monnieri* is a myth. *I. laevigata* is distinguished from *I. Kaempferi*

(of which it is often given as a synonym) ; the origin of the Japanese florists' forms of the latter remains to some extent mysterious. *I. Lamancei* recovers its original name *foliosa*. The Californian group have been the subject of minute study, and here again simplification of the list is the result. *I. versicolor* is identified with *I. virginica*. (I have a letter from Sir M. Foster which makes this clear.) The *longipetala* group and the *setosa* group were also sadly tangled, but we have now at least clues to the maze. The anomalous *I. verna* is removed from its uncongenial place in the Pardanthopsis section. *I. lacustris* becomes a local form of *I. cristata*. Perhaps I may add my experience that the former, if more difficult to obtain, is the easier form to cultivate. The propagation of these from "cuttings" is recommended, and I can testify to the soundness of the advice. In the naming of the *Oncocyclus* group considerable concession is made to gardeners—perhaps a somewhat ironical boon, as for most gardeners this extraordinary group has but an academic interest. Those who still refuse to admit defeat in the struggle may like to try Mr. Dykes' plan of "cold storage" of the rhizomes. In the *Regelia* group—which, by the way, presents no real difficulty in cultivation, and, unlike the wayward *Oncocycli*, is extremely rewarding—*I. Leichtlini* and *I. vaga* become one species under the name *I. stolonifera* while *I. Suworowi* becomes *I. darwasica*. *I. Alberti* is now put into a class of Asiatic *Pogoniris* (along with the even less familiar *scariosa* and *imbricata*), instead of being among the Pseudevansias: and the older idea that it requires the same kind of fuss as the *Oncocyclus* group seems to be exploded. But where is it to be obtained? I have known *I. graminea* to be sold under this name! *I. arenaria* appears as a local form of *I. flavissima*. Probably the most difficult classificatory problem of all is presented by the dwarf Pogonirises, which Foster hoped to work out "some day." Here, from careful consideration of local distribution, we have now at all events a satisfactory arrangement, which makes short work of such supposed distinct species as *I. attica* and *I. benacensis*. The lists of nurserymen are in this matter very confusing, *e.g.* they call almost any dwarf bearded iris *I. pumila*, and they have introduced the baffling term "Crimean irises," which is founded apparently on a confusion between Olbia in the Crimea and the ancient town of Olbia in Provence (whence *I. olbiensis*)! The name *aphylla* now denotes all dwarf Irises with a low-branching stem, and swallows up *furcata*, *Fieberi*, *hungarica*, *biflora*. This delightful plant, by the way, in its various forms can be easily grown in soils in which such dwarf species as *pumila* and *chamaeiris*—to say nothing of *pseudo pumila* and *mellita*—are not satisfactory. The list of tall European *Pogoniris* species is considerably reduced, and it is noticeable that Mr. Dykes thinks it likely that all the countless forms of so-called 'German irises' are ultimately derived from *I. pallida* and *I. variegata*! Foster had abbreviated the list of original parents of these to four or five. *I. Junonia* and its allies *Cypriana*, *Trojana*, &c., now make a distinct

group of "Pogoniris of Syria and Asia Minor," and *Junonia* is established as distinct from *Cypriana*. *I. albicans* is at length properly separated from *I. florentina*, which is probably a *germanica*, while *albicans* (as said above) is of Eastern origin. In passing be it said that no one who is content with *florentina* as a white iris can have seen the white solid splendour of *albicans* (matched only by the 'Shelford' white seedling of *I. kashmiriana*), though unluckily the latter always seems to feel our winters, and does not usually flower in England as it does in the Mediterranean region.

I. Bartoni becomes a yellow form of *I. kashmiriana*, which may explain why in most gardens it is equally unsatisfactory.

No explanation seem to be offered how *I. germanica*, being presumably the national flower of France, came by its name. But the obscurity which veils its origin is pointed out, and the reader is challenged to say if he knows of any locality where it is indisputably wild, abundant as it is about old castles, on old walls and on rocks near the present or past habitations of men. This plant, which adorns most cottage gardens in this country, and, in various forms, hundreds of railway stations in France, presents in fact more than one curious problem. Has anyone raised from seed or fertilized with any other kind the ordinary form with which we are all familiar, and which some still regard as the "type" of all the absurdly so-called 'German' Irises? I may say that I have occasionally gathered a single seed pod naturally fertilized, and that I have two or three seedlings which have not at present flowered, and which do not seem to grow with the indomitable vigour of their parent.

The treatment of the bulbous species adds a good deal to Foster's little monograph. The Junos, which were formerly classified by mere size, now make three groups; as to *I. reticulata* it is made almost certain that the reddish form, and not the more familiar blue, is the "type."

I. tuberosa ceases to be an iris altogether, and is to be called *Hermodactylus tuberosus*.

Of the plates little need be said except by way of praise both for the drawing and the reproduction. The colours are in nearly every case marvellously faithful, and the character of each kind is well shown. The plate of seeds is an interesting study. Two hybrids raised by the author are figured as having points of special interest; one between *fulva* and *foliosa*, neither of which has probably been crossed before, the other between *Loppio* and *tectorum*, in which the crest of the latter species appears as well as the beard of the former.

In all technical matters of execution it would be difficult to find anything to criticize; the print and the arrangement are worthy of the great press which has undertaken the work. Nor could anyone but an expert as well qualified as the author himself discover any serious inaccuracy in matters of fact. Perhaps one may express a hope that he will make a renewed study of the means by which the flowers of the various groups are naturally fertilized. On one small point, almost of a personal nature, I feel proud to be able to make a

correction: *I. hexagona*, it is recorded, is only known to have flowered out of doors in one place in Britain, viz., the Cambridge Botanic garden, but it produced flowers in my garden in 1910, though it is true that a slug, with the unerring instinct of his race for any uncommon food, ate off the buds.

"The Ring of Nature." By G. G. Desmond. 8vo., xiii + 298 pp. (Methuen, London, 1913.) 5*s*. net.

The year month by month, with some of its natural wonders in animal and plant life, is the theme of the present book. The essays are well written, the observations evidently those of a field naturalist, the few theories advanced the result of careful thought. It is altogether a very readable book.

"Genetics: An Introduction to the Study of Heredity." By H. E. Walter. 8vo., xv + 272 pp. (Macmillan, New York, 1913.) 6*s*. 6*d*. net.

An introduction to the study of any subject ought to give a clear and definite statement of the main facts upon which hypotheses are based; a clear statement of the hypotheses themselves; and a criticism of each of those deemed worthy of inclusion, with an indication of the ascertained facts that fail to fall into line with the hypotheses. At the same time the author's own views ought not to be unduly obtruded. Judged from this standpoint the present book is an excellent one in all respects.

We are glad to see the author makes a clear distinction between the causes of variations and the facts of their occurrence. The two phases need to be studied separately if progress is to be made. Further, he clearly distinguishes between the effect on the life of the individual of the three factors—heritage, environment, and training. No doubt the last factor is largely conditioned by the second, but all must be taken into consideration and separately studied if their relative values are to be ascertained. Like the great majority of thinkers on heredity he takes the attitude that "the inheritance of acquired characters is by no means . . . established," and "the weight of probability is decidedly against the time-honoured belief in the inheritance of acquired characters."

Of the application of Mendelian laws to the improvement of the human race the author has some remarks to make, ending with the pertinent inquiry "Who shall sit in judgment?"

"Garden Work: A Book for Garden Lovers." By William Good, F.R.H.S. 8vo., xvi + 359 pp. (Blackie, London, 1913.) 5*s*. net.

We can recommend this book to those who are interested in general gardening, for it deals well with vegetable, fruit, and flower growing, not neglecting some of the more prominent facts of soil and plant

science. The insects and fungi most frequently met with are dealt with, and appropriate methods of treatment are detailed. The illustrations also are most useful in elucidating the text, and are well reproduced. One little point perhaps deserves a note. While it is quite true that peas, like other leguminous plants, are independent of supplies of nitrogen from nitrates and salts of ammonia in the soil, yet it not infrequently happens that better crops and more abundant yields are obtained in the garden after the use of organic manures such as farmyard manure than without this aid. This is largely due, no doubt, to the water-holding capacity of these substances, and perhaps also to the stimulative effect of some substances of which we at present know little, formed as a result of the decomposition of the manure. This of course the pea participates in as well as other plants, and this also probably explains the greater value of farmyard manure over the chemical manures alone with which every grower is familiar in practice.

"School Gardening, with a Guide to Horticulture." By A. Hosking. 8vo. xi + 326 pp. (University Tutorial Press, London, 1912.) 3*s.* 6*d.*

Sixty-eight pages of this little book are devoted to the school garden, the remainder deal with gardening, and no doubt will be useful to teachers in school gardens, to cottage gardeners, and others. A considerable amount of useful advice on the starting and maintenance of a garden is given in the opening chapters with plans and systems of cropping. The chapter on correlation with other school subjects should also prove useful and suggestive. We could wish the sample note-books had shown a little more detail of how things noted were done, and still more of why they were done.

There are so many useful books on gardening now, and scarcely any dealing at all well with school gardening, that we could have wished the author had devoted more space to the main subject of his book as indicated in the title and less to the "guide to horticulture." No fewer than fifty pages are devoted to lists of plants—few of which can possibly find room in a school garden, and much of these, at least, might have given place to a fuller account of the working of a school garden.

"Elementary Biology: Plant, Animal, Human." By J. E. Peabody, A.M., and A. E. Hunt, Ph.B. 8vo. xxi + 170 + 194 + 229 pp. (Macmillan, New York, 1913.) 5*s.* 6*d.* net.

Most books on elementary biology take the theme of morphological relationships. This differs from them in having as its central idea the functions of living things, considering the form in relation to these functions, and the effect of their performance upon human life and surroundings. This, it seems to us, is the proper standpoint from which to view the subject in a school course; it makes it at once

a living study, raising it above the dry bones of a matter to be learnt because one must, and appealing to the young inquiring mind, which is always wanting to know how a thing works, if the mind is a normal one. The whole book is well thought out, clearly written, and one we can recommend to teachers seeking a guide in this subject.

"A First Book of Rural Science." By J. J. Green, B.Sc. 8vo. viii + 146 pp. (Macmillan, London, 1913.) 1*s.* 6*d.*

This is an excellent little book on plant life and the soil, with reading matter and suitable practical exercises designed to enable the young student to gain a knowledge of the way a plant lives, and of the treatment of its environment to enable it to thrive in the best way. It is suitable for use in evening continuation schools, and even for the upper classes of elementary schools.

"Illustrated Key to the Wild and Commonly Cultivated Trees of the North-Eastern United States and Adjacent Canada." By J. F. Collins and H. W. Preston. 8vo. vii + 184 pp. (Holt, New York, 1912.) Cloth $1.35; leather $2.50.

This little book with limp cloth covers and rounded corners is intended as a pocket companion for those whose wanderings take them among the trees of the district of which it treats, and who desire to know the names of those they meet with. We have tested it for one or two North American trees and find it "runs them down" with ease. It should prove very helpful in America, and will be of use in Britain in getting at the names of many introduced trees.

"Growing Crops and Plants by Electricity." By E. C. Dudgeon. 8vo. viii + 36 pp. (Rentell, London, 1912.) 1*s.* net.

Miss Dudgeon has rendered a service to horticulturists by bringing together a brief account of what has been done in a practical way in applying electricity to the growing of plants. An account of the application of high-tension electricity to field crops and of electric light to plants in houses is given with weights, &c., obtained. Miss Dudgeon's own experiments have been mainly with the mercury vapour lamp, and the results she gives as to the acceleration of germination and growth are often remarkable. It would have been helpful if she could have gone into greater detail, for the use of a mercury vapour lamp would be comparatively simple. The average maximum and minimum temperatures are given for the houses taken at 9 A.M., but nothing shows what effect the lamp had in raising the temperature while it was alight. We do not find what precautions were taken to see that the water in the soil was kept even, nor do we discover whether the moisture in the air was the same in both cases. In one case the produce from twelve pea seeds (54 pods) is compared with that from five (19 pods), but apart from the fact that these are very small yields

indeed, we are not told what the range of individual variation was, a point absolutely essential if one is to form any judgment on the results obtained from such a small number of plants, nor are we told how many plants produced these pods. We hope Miss Dudgeon will give us a little later fuller particulars of her interesting experiments, for if mercury vapour lamps will assist the market grower to produce crops even three or four days earlier than he otherwise could the result will be most valuable to him. We note that the Evesham experimental results, 1906–1909, are given. Were they continued in the curiously abnormal seasons of 1911 and 1912 ? It would be interesting to know with what result if so.

"Crops and Methods for Soil Improvement." By Alva Agee, M.S. 8vo., 246 pp., with 24 illustrations. (Macmillan, New York, 1912.) 5*s.* 6*d.* net.

The first sentence explains the character of the book :—"This book is not a technical treatise, and is designed only to point out the plain, every-day facts in the natural scheme of making and keeping soils productive." Average yields of crops in the United States are low because the humus content has been gradually reduced by bad farming methods. There are relatively few acres remaining that do not require intelligent treatment for the production of good crops, and a large area has fallen below the line of profitable production, especially in the eastern half, almost all of it requiring lime, organic matter, and available plant food. The methods of supplying the second of these, mainly by the growth of grass and legumes, occupy the greater part of the book. The book is well written, with an almost entire absence of any but the most elementary technical terms, and should form a good handbook for those farming the lands in question, while the chapters on manuring, natural and artificial, are of general application. An index would be an improvement to the book, though the want of this is to a great extent made up for by a paged analysis of its 23 short chapters.

"A Book of Salads. The Art of Salad Dressing." By Alfred Suzanne. Revised and augmented by C. Herman Senn. 8vo., 99 pp. (The Food and Cookery Publishing Agency, London, 1906.) 1*s.* 6*d.* net.

It is quite a remarkable fact that many English people have not the faintest idea of a salad beyond lettuce, endive, and beet, accompanied by a more or less indigestible dressing highly flavoured with vinegar. Yet, as is shown in this work, many very delicious and appetizing dishes can be prepared from almost any vegetable or fruit. The "Book of Salads" is very complete and contains some 198 recipes, including even salads composed of ostrich eggs and chrysanthemums, and it will be found a useful adjunct to the culinary library.

"Chrysanthemums." By Thomas Stevenson. With chapters by C. Harman Payne and Charles E. Shea. 8vo., 112 pp. (Jack, London, 1912.) 1*s.* 6*d.* net.

Like all the "Present-day Gardening" series, this book is most entertaining. The introduction, dealing with the history of the chrysanthemum, will be enjoyed by many people who take not the slightest interest in chrysanthemum cultivation. It appears to be one of the oldest flowers in cultivation, and was mentioned in the writings of Confucius about 500 B.C., since when it has known many vicissitudes, but has always been more or less popular.

There is a very interesting chapter by Mr. Charles Shea on the raising of seedlings, which is a comparatively simple operation if attention is given to the necessary details.

All the various types of flower are described, with particulars of cultivation for exhibition and border work, and eight varieties are beautifully depicted in colour-photography by T. Ernest Waltham.

"Plant Diseases." By Dr. W. F. Bruck. Translated by Professor J. R. Ainsworth-Davis, M.A. 8vo, 152 pp. (Blackie, London, 1912.) 2*s.* net.

This little book will serve the beginner as an introduction to the pests of various cultivated crops, but it does not deal at all thoroughly with the important question of the methods to be adopted in order to get the upper hand of the pests that are sure to be met with. One important point is recognized in the book, viz. that in order to avoid plant diseases the best thing the cultivator can possibly do is to keep his plants in health. This is too often overlooked, and there has grown up in some quarters the entirely false idea that the scientific cultivation of plants is concerned in fighting pests, and in that alone! There are more comprehensive books on the subject treated in this country and some dealing more intimately with diseases too frequently met with, but lacking these the grower will be able to learn a considerable amount of important matter from this little treatise.

"Heredity." By Professor J. A. Thomson, M.A. Ed. 2. 8vo, xvi + 627 pp. (Murray, London, 1912.) 9*s.* net.

We are glad this admirable book has reached a second edition so soon. When it was first issued five years ago we read and reviewed it with great pleasure, and now that the author has been able to revise it and bring up to date the matters in which so much progress has been made during the past few years it will still maintain its position as one of the most able and readable books on the subject of which it treats.

"No Plant Disease." By Arnold Eiloart. 8vo., 89 pp. (Daniel, London, 1913.) 1*s.* net.

Within the past few years there has arisen an idea in some quarters that the use of animal refuse as a fertilizing medium is "unclean"

and detrimental to plant health. This is an hypothesis difficult to sustain, and the present little book is a sane and tolerant *exposé* of the fallacy contained in it.

"Agricultural Chemistry." By H. Ingles, B.Sc., F.I.C. Ed. 3. 8vo. vii + 397 pp. (Scott, Greenwood, London, 1913.) 7*s*. 6*d*. net.

First published in 1902, this excellent textbook has been thoroughly revised and brought up to date, so that it will prove, as in the past, an excellent handbook for students of agricultural chemistry. It is, of course, not a book that anyone with no previous chemical knowledge can read with advantage, but those who have had an elementary course of chemistry will be able to use it to extend their knowledge of the application of chemistry to agricultural problems of all kinds, and will find it a thorough and reliable guide. A prominent feature of the book is the large number of references to original papers which it contains, enabling the student to follow up any particular point with a minimum of trouble in routing out references.

"The Perpetual Flowering Carnation." By Montagu C. Allwood. 8vo, 210 pp. (Cable Printing and Publishing Co., London, 1912.) 3*s*. net.

This is a well got-up book, nicely printed, containing numerous illustrations from photographs, of a particularly helpful nature, and should prove especially valuable to large growers of perpetual flowering carnations.

The history of the plant has been fully dealt with, and the instructions as regards propagation and general culture are exhaustive and very clearly laid down. Some exception will be taken by many gardeners and amateur florists to the statement that the perpetual carnation must eventually supersede the border varieties as summer bedding plants. This can never be so as long as the latter retain their great superiority in simplicity of culture and floral refinement, though, of course, the perpetual variety can be employed to much advantage where continuity of bloom is desired, and is essentially a greenhouse flower.

The author has devoted much pains to the details attending propagation and treatment immediately following, and his precise style, especially while dealing with cultural hints, will be appreciated by lovers of his favourite flower. A particularly interesting chapter is devoted to the raising of new varieties, and a most useful book concludes with an elaborate calendar of operations showing clearly the work to be done month by month.

"The Cotton Plant in Egypt: Studies in Physiology and Genetics." By W. Lawrence Ball, M.A. 8vo, xvi + 202 pp., illus. (Macmillan, London, 1912.) 5*s*. net.

This volume forms the fifth instalment of the series of science monographs which is now in course of publication, and, in accordance

with the scheme of the series, the author has confined himself chiefly to his own investigations in the particular line of research with which the subject-matter deals.

Mr. Lawrence Ball is botanist to the Egyptian Government Department of Agriculture, and this book contains an abstract of the results of a series of researches he has made upon the cotton plant in Egypt. The problems he set himself to solve were numerous and diverse, and the care and knowledge displayed in the investigations are worthy of all praise. In the preface we are told that the work began as genetics but extended into physiology. The physiological researches were necessitated by demands for information as to the effect of unsuitable soil-water conditions (cotton being an irrigated crop in Egypt) on the cotton plant, and these have given results of more immediate interest, and greater novelty, than the researches concerned with genetics, although the latter may eventually prove of higher intrinsic value. The physiological researches have shown that a high water-table is harmful to the cotton crop at certain seasons, and, to obviate this, drainage and a restricted irrigation are now being applied. The breeding experiments on Mendelian lines have thrown much light on the causes of the deterioration of the Egyptian cotton, and the author insists, as a result of these experiments, that any scheme for the improvement of the stock by the introduction of new varieties is doomed to failure unless care is taken to prevent contamination, by renewing continually the supply of the pure strain.

The importance of the cotton crop both to England and Egypt cannot be over-estimated, consequently any contribution to a more complete knowledge of the plant and its requirements is of the greatest value. This book, besides adding to our knowledge of the cotton plant itself, contains much that will appeal to the student of plant physiology, while the Mendelian will find the results of the breeding experiments of great interest.

"Soil Conditions and Plant Growth." By E. J. Russell, D.Sc. 8vo. viii + 168 pp. (Longmans, Green, London, 1912.) 5*s*. net.

Recent research in soil chemistry, physics, and biology has greatly extended knowledge of the conditions existing in the soil as they affect plant life, and a book giving the results of these researches, fitting them into their places in the general scheme, and doing it all in such a masterly and lucid fashion as is the case here, will meet with a hearty welcome from all concerned in teaching soil science, and from those who base their practice on as full a knowledge of soil and plant life as is attainable rather than on the practice of their neighbours as seen by looking over the hedge. To all such we commend it. The main problems dealt with are the requirements of plants and the constitution of the soil; the carbon and nitrogen cycles in the soil; the biological conditions in the soil; the soil in relation to plant growth; soil analysis and its interpretation. An appendix gives the methods

of soil analysis in use, and a selected bibliography adds greatly to the value of the book.

"Injurious Insects: How to recognize and control them." By W. C. O'Kane. 8vo, xi + 414 pp. (Macmillan, New York, 1912.) 8*s.* 6*d.* net.

Of the injurious insects dealt with and figured in the pages of this American book, a large number are known and many are dreaded in this country. The pests of all kinds of crops are included, and they are figured by means of photo-process blocks. We prefer clearly-drawn line figures for the illustration of a book of this sort, but many of the photographs reproduced are of above the average merit and add to the readiness with which insects may be identified. The text gives an account of the symptoms of attack, very lucidly written, and of the damage done, and a life history of the pest. Where they are known, appropriate methods of dealing with the pests are quoted, and full details of these methods are given in the opening chapters. It is a clearly written, well-got-up book, which the ordinary cultivator will find very valuable.

"British Fern Varieties." By F. G. Heath. 8vo, xvi + 271 pp. (Kelly, London, 1912.) 3*s.* 6*d.* net.

Mr. Heath's books have been widely read, by fern lovers perhaps especially, and they have until this last dealt with the normal forms of our native ferns. This deals with some of the varietal types which the advanced fern-hunter has found so frequently and cherished so tenderly. The author says: "I am a firm believer in 'royal roads' . . . to knowledge." We are all conversant with the myriads of technical terms with which scientific treatises are loaded, and since botany (or at least a love of plants and an effort to understand something of their ways) is one of the most popular of the branches of knowledge, botanical science has come in for more than the usual number of knocks on this score from the popular writer. Perhaps it has a little deserved some, for there has been a class of botanists well satisfied if they could give a name to a plant—they are now happily few and far between. The present author complains that "scores of books on botany give only the scientific names (as they are called) of plants, and hence are obviously quite unintelligible to those . . . who have to confess ignorance of the 'learned language'!" He goes on to remedy this state of affairs by giving "common" names to many of the varieties—as thus: 'Deeply-cleft True Maidenhair,' 'Ear-lobed Common Polypody,' 'Double-pinnuled Common Polypody,' 'Skeleton Soft-Prickly Shield Fern,' 'Grandly-tasselled Soft-Prickly Shield Fern,' 'Refracted Rock Spleenwort,' and so on. It is needless to repeat others, but surely these are not "common" names. After a lifetime among plants we have never heard them mentioned! In spite of these, and gibes which were perhaps better left out of a book there is much of interest and much of information in this little work,

which is fully illustrated, mostly by line-drawings. One other little point we notice that the fern enthusiast will be sure to take exception to—the statement that many varieties are not constant. This is true if forms induced by the immediate surroundings of the wild plant are called varieties, but not of many others.

"Vegetation of the Peak District." By C. E. Moss. 8vo., 235 pp. (University Press, Cambridge, 1913.) 12*s.* net.

This is a valuable work of its kind, being a full description of the "Associations" of plants of the country. It commences with a general description of the Peak and its climatic conditions, the remaining eight chapters dealing with the Woodland, Scrub, Grassland Associations, those of rocks and screes, marsh and water, moorland and cultivated areas. There are thirty-six excellent photographs and two coloured maps.

The book affords a good illustration of the primary part of modern "Botanical Geography." No student is to-day satisfied with collecting plants, quite irrespective of any interest in their natural surroundings. Plant "Ecology," or the study of plants at home, implies observations of every kind which constitute the "environment" of the individual plant to be studied. As the latter is usually associated with others, the "group" is to be studied to find out how it is they live together. This leads to the study of the inorganic "factors," light, shade, degree of water, soil, &c.

Then follows a careful *internal anatomical* study to discover how or why this is correlated with the *external factors* or conditions of life.

M. Aug. Pyramus de Candolle appears to have been the pioneer in Ecology, in his article on "Botanical Geography" ("Dictionnaire des Sciences naturelles," vol. 18, 1820). He takes each factor, heat, light, water, soil, atmosphere &c., and tabulates the details of plant-structure under each; and thus recognizes "stations" *e.g.* salt marshes; fresh and stagnant water, &c. He recognizes the universal struggle for existence, and how "the fittest" *under the circumstances* survive. Thus "*Carex arenaria* in sand chokes those which in clay choke it." In fact his article might have been the model for Schimper's "Plant Geography," for he too recognizes much more than the "grouping of plants into separate floral districts. . . The essential aim of geographical botany will be an inquiry into the *causes* of differences existing among the various floras. . . Experience shows . . that differentiations [of structure] are profoundly and rapidly modified by changes in the environment, every one of which immediately involves a change in the organization of the plants." This was Darwin's alternative explanation of evolution, which is now widely accepted by botanists as superseding his tentative theory of the *Origin of Species by means of Natural Selection.*

This side of Ecology, however, is practically untouched by Mr. Moss, who, nevertheless, has done excellent work in the *primary* department of Ecology.

"Plant Geography." By Prof. G. S. Boulger. Sm. 8vo., 136 pp. (Dent, London, 1912.) 1*s.* net.

This small work contains three "Books," as well as one on Bibliography and an Index. Though only of 130 pp. (6 × 4 in.) it deals with eighteen subjects, *e.g.* Distribution of Land and Water in the Past, Floras of the Past, the factors of Distribution, Environment, Insular Floras, Floristic Regions, &c., &c. Each subject is packed with data, perhaps a little too fully for a *Primer*, and there are too many new technical terms given, which some writers on Ecology have needlessly multiplied to an inordinate degree. The readers will find the subject as fully worked out as possible in the circumstances.

"Herbals, their Origin and Evolution: A Chapter in the History of Botany, 1470–1670." By Agnes Arber, D.Sc. &c. 8vo., 253 pp., with 21 plates and 113 text-figures. (University Press, Cambridge, 1912.) 10*s.* 6*d.* net.

This book contains eight chapters dealing with the following subjects:—The Early History of Botany; The earliest printed Herbals (fifteenth century); The early History of the Herbal in England; The Botanical Renaissance of the sixteenth and seventeenth centuries. Then follow three chapters on the Evolution of the Art of Plant Description, of Plant Classification, and of illustrations.

Lastly, the Doctrine of Signatures and Astrological Botany are considered.

Each chapter deals very ably with the subject confined to it, and all the principal Herbals are described and illustrated. Excellent contemporary portraits of some of the most eminent "Botanists" are also given. Those who are interested in the subject will find very much and well digested information. Though professedly treating of Herbals, of the two hundred years (1470 to 1670), there is an excellent epitome of the earliest writers, such as of Aristotle and Theophrastus, to whom Pliny and Dioscorides, of the first century, were much indebted.

Before the days of printing, many "medical works" were written, especially during the fourteenth century. They dealt entirely with drugs and their supposed virtues: even anæsthetics are described, being used for surgical operations of the fifteenth century; but being composed of such poisons as opium, belladonna, bryony, henbane, &c., all combined in one dose, it is no wonder that the use ceased at that time! The authoress, however, does not allude to the preceding fact, as it is not in the "herbals"; though she quotes several recipes, charms, &c., with which the antecedent MSS. abound.

The authoress does not confine herself to British Herbals, but discusses those of Italy, Switzerland, and France as well.

It is to these herbalists that Botany, as a science, was due; for

the evolution of the scientific study of plants grew out of the previous study of them solely for medical purposes.

She does not mention it, but we all make use of two familiar expressions which appear to be due to old medical botany, when everyone who could grew their own "simples," *i.e.* the *separate species* which were made up into a "compound" drug, some containing no less than fifty simples combined. It was most important to get the crop "well cut and dried" before winter. When, however, "drugs" (*i.e.* "dried" herbs) were found not to have the virtues assigned to them, we may assume that they became unsaleable as "drugs in the market"!

"Makers of British Botany.—A collection of Biographies by living Botanists." Edited by F. W. Oliver. 8vo., 323 pp. (University Press, Cambridge, 1913.) 9*s.* net.

This interesting volume contains the biographies of seventeen botanists, as well as a sketch of the Professors of Botany in Edinburgh from 1670 until 1887, by I. B. Balfour.

We learn from the Introduction that the volume represents a course of lectures arranged by the Board of Studies in Botany of the University of London and delivered in 1911 at the University College. There were ten lectures, but additional biographies were added to make the work more fully representative.

Four of the botanists lived in the seventeenth and eighteenth centuries, one only living entirely in the latter. Four lived from the eighteenth into the nineteenth century; and six in the nineteenth. Lastly, Sir J. D. Hooker and Marshall Ward died in the twentieth.

Reading the lives consecutively, one gets an admirable conception of the progress of the science from the seventeenth to the twentieth century. The earliest "botanists" were herbalists, as plants were only collected for their supposed uses as drugs; it was not till the sixteenth century that plants began to be studied, and classified in anything like a scientific way.

In the life of Grew (1641–1712), who initiated the study of vegetable anatomy, we find he "was alive to the importance of the ecological standpoint," for he observes "the proper *Places* also of *Plants* . . . should be considered . . . as to *Climate*, *Region*, *Seed*, &c."

It was in Grew's time that Sir T. Millington suggested that the stamens were the male organs: thence Linnæus subsequently established his sexual system.

Hales, the Father of Physiology, lived from 1677 to 1761. Of his "Vegetable Staticks," the botanist Sachs observes: "It was the first comprehensive work the world had seen devoted to the nutrition of plants and the movement of the sap."

Space will not allow a more extended account, but the reader will gather that in each life he will find the most prominent features of each man's life work in the study and advance of botanical science.

"The Theory of Evolution in the Light of Facts." By Karl Frank, S.J. Translated from the German by C. T. Druery. 8vo., 241 pp., with 48 illustrations. (Kegan Paul, London, 1913.) 5*s.* net.

It is pleasant to read a book on Evolution by a Roman Catholic, and to find "*Nihil obstat*, Josephus Wentker, *Censor Librorum*," printed on the flyleaf!

The book has four sections:—General (Palæontological) Bases of the Theory of Evolution. The author has compiled a fair series of facts from authors on Palæontology showing the sequence, and dealing with questions involved, summing up the Results of Palæontological Research into the Evolution of Organic Life.

Section II. enters "The Explanatory Domain of the Hypothesis of Evolution," but refrains from recognizing it as an *established fact*. The author rightly says we cannot suppose how life can come from non-life; the greatest stumbling-block is the origin of *Directivity* in all organic beings by which *purposeful* structures are evolved. The author also shows the impossibility of spontaneous generation, abandoned by nearly all scientists at the present day. In the third section an account is given of Evolutionary Hypotheses, dealing with Lamarck and Darwin. He says that Darwin denied the "Self-adaptation" of Lamarck; but this is a mistake. It is totally wanting in "Darwinism"—that is, *the Origin of Species by means of Natural Selection*; but it is the basis of Darwin's *alternative* explanation of Evolution; but the author adds "Neo-Lamarckism . . . is a terrible mixture of assumptions and postulates without any comprehensible basis at all." As a matter of fact it is *no theory*, but absolute fact, because solely based on *induction* and *experiment*, without any assumptions whatever.

The author gives no sign of being a working or practical naturalist himself, and therefore has fallen into the usual mistake of endeavouring to criticize other writers without the practical familiarity with nature necessary for so doing. He concludes: "Theories of evolution will remain, since everything points to the fact that there was and is an evolution of the organic world." But "neither was life acquired by the organisms themselves nor were the evolutional tendencies; both were received from another source—from the Creator."

"Problems of Life and Reproduction." By Dr. Marcus Hartog. 8vo., 362 pp. (Murray, London, 1913.) 7*s.* 6*d.* net.

This interesting work consists of a number of separately published essays, dealing with Problems of Reproduction, and of Heredity; of the "New Force" Mitokinetism; Fertilisation; the Transmission of Acquired Characters; Mechanism and Life, &c. In each case the author deals with his subjects exhaustively, and the illustrations, such as to explain "Mitokinetism," are very good. With regard to this "new force," the author shows that certain phenomena in cell-division mimic electric procedures; but the reader must study

chapter IV. to understand it in detail, as it is too complicated to be reproduced here. Every chapter or essay is full of interesting matter.

"Catalogue of the Plants collected by Mr. and Mrs. P. A. Talbot in the Oban District, South Nigeria." By A. B. Rendle, E. G. Baker, H. F. Wernham, S. Moore, and others. x + 158 pp., with 17 plates. (British Museum, Natural History.) 9s.

This modest but thorough little volume is an interesting evidence of the solid contributions to botanical knowledge which are constantly in progress in the National Herbarium, side by side with the various popular works for students which have emanated from it of late years. We regret that the map of the district, published in the *Geographical Journal*, has not been reproduced in this volume, which contains no precise indication of the latitude and longitude of the area in question. That in three years a collection of 1016 species should have been made and many of them illustrated, as we are told in Dr. Rendle's preface, by large drawings, says much for the industry of the collectors, and we are sorry that by the fortune, or misfortune, of publication, *Talbotia* S. Moore of May 1913 is anticipated by *Afrofittonia* Lindau of March in the same year. That the collection contained nine new genera and 195 new species is an indication of the extent to which our rapidly advancing knowledge of the flora of tropical Africa is rendering the Kew *Flora* obsolete before it is completed. The chief physiological point of interest would seem to be the puzzle of cauliflory, the sending forth of blossoms from the stems and other old wood of trees, a phenomenon familiar throughout the tropics, as, for instance, in the well-known case of the Cacao (*Theobroma*), but especially common in this South Nigerian flora. The statement (p. viii) that some of these cauliflorous trees "only blossom every two or three years," or, according to the natives, only "once in seven years," is suggestive, and may support Schimper's opinion that the phenomenon was connected with the softness and non-resistance of the bark.

There is, of course, nothing very new in Mr. Talbot's observation of the immense specific variety of the tropical forests, which he puts at 400–500 species to the square mile; but Mr. E. G. Baker's new genus *Crateranthus*, "intermediate in structure between *Napoleona* and the tropical South American *Asteranthos*," and Mr. Wernham's *Afrohamelia*, "most nearly allied to the tropical American *Hamelia*," seem to us interesting evidence for Dr. von Jhering's Archhelenis or Frech's Sud-Atlantis, *i.e.* a continental connexion between South America and Africa in late Tertiary times.

It is somewhat remarkable that none of the Cryptogamia proved novel.

A slightly misleading note is prefixed to the Index, to the effect that "Names in the systematic list are not included," whereas the fact is that only such names are excluded as occur *only* in the systematic list, which is a list of the entire collection.

"British Violets: a Monograph." By Mrs. E. S. Gregory. With an Introduction by G. Claridge Druce, M.A., F.L.S. xxiii + 108 pp., with 34 plates. (W. Heffer, Cambridge, 1913.) 6*s.* net.

At the present day it is naturally but seldom that an indisputably distinct and indigenous species is added to the British flora. There yet remain, however, the many "critical" groups, in most, if not all, of which natural hybridism occurs, whilst in other cases species may be said to be in the making. Opinions are likely to vary here as to the grade of various forms, and nomenclature is almost certain to add to the complexity of subjects already naturally complex. A specialist has the opportunity of examining some type specimens, or a Continental botanist visits this country and forms previously misnamed are recognized as well known elsewhere, or as being so far "new" that they are by no means entitled to the names we have been in the habit of giving them. The thorough study of any critical group leads almost invariably—however much hybridism may be recognized—to an increase in the number of species acknowledged as such by the monographer.

Mr. Druce, in his interesting historical sketch of the genus *Viola*, attributes four species, apparently *V. odorata* L., *V. Riviniana* Reich., *V. palustris* L., and *V. hirta* L., to the seventeenth century; *V. canina* L. and *V. lactea* Sm. to the eighteenth; and *V. stagnina* Kit., *V. arenaria* D.C., and *V. silvestris* Lam. to the nineteenth. Mrs. Gregory, who is to be congratulated on this fruit of more than twenty-five years' study of violets, has, during the present century, added *V. montana* L. and *V. epipsila* Ledebour to the list. Restricting our attention, as does Mrs. Gregory, to the section *Nominium*, *i.e.* excluding *V. tricolor* L. and its forms, and ignoring sub-species, varieties, forms and probable hybrids, we find Syme, in *English Botany*, recognizing seven species, Hooker in 1884 with six, Messrs. Groves, in their edition of Babington's *Manual*, with eight, and Mrs. Gregory with twelve species. In addition to these "species," however, Mrs. Gregory describes upwards of sixty forms, twenty-seven as varieties, nineteen as forms and sixteen as hybrids. Most of these have been studied under cultivation, and nothing can be better than the way in which they are discussed and described with full synonymy and references to distribution.

Of the illustrations we prefer Miss Mills's line drawings to the photographs from herbarium specimens; but we are not sure whether in such a group, where, for instance, considerable importance has been attached to the colour of the spur, coloured illustrations are not essential.

As to Mrs. Gregory's share of the work, in which she makes the fullest possible acknowledgment of all help received, we can only presume to make two slight objections: first, that on p. xxi the name of the authority for the sectional name would have been better in different type from that in which the name of the section appears; and, of greater importance, we may, perhaps, ask from the fulness

of her knowledge for "characters" of the genus, the section and its various subdivisions.

For the benefit of the writers of popular text-books who do not seem to study systematic works or special memoirs, it may be remarked that Mrs. Gregory once more alludes to her proof that the Sweet Violet is not wholly dependent on its cleistogene flowers for the production of seed. The production of the two types of blossom is shown (p. 48) to be largely a question of sunshine or shade.

We could wish that it had been possible to print the body of the work on less weighty paper.

"Hampstead Heath: its Geology and Natural History." Prepared under the auspices of the Hampstead Scientific Society. 328 pp., with 3 maps and 11 plates. (T. Fisher Unwin.) 10*s.* 6*d.* net.

A pleasant, healthy, picturesque, and most accessible suburb, Hampstead has had an interesting and varied list of distinguished residents, artists, poets, and men and women of letters, with the result that quite an extensive series of works has appeared dealing with its history and associations. As the bit of unspoilt country nearest to the heart of the City, it has naturally also been at all periods a favourite resort of lovers of Nature, from Thomas Johnson and his fellow apothecaries who drew up the list of plants on *Ericetum Hamstedianum* in 1629, to Samuel Pickwick, Esq., G.C.M.P.C., who, on May 12, 1827, communicated his "Speculations on the Source of the Hampstead Ponds, with some Observations on the Theory of Tittlebats," to the Club that bore his name. Nor have their researches gone unrecorded. Park's work in 1814 was entitled "Topography and Natural History," and the late Mr. Lobley's volume of 1894 was mainly occupied with the physical, rather than with the antiquarian, side of the subject. At the same time it was a most laudable determination on the part of the members of the Hampstead Scientific Society, when it was founded a dozen years ago, to prepare, by that co-operation which alone can make such projects uniformly successful, a survey of the Natural History of their area. That area—"within a radius of three miles from the Flagstaff on the summit of Hampstead Heath"—is, it is true, an artificial one. It includes, as Mr. Rudler points out in his excellent geological chapter, considerable areas of London Clay and Boulder Clay, which is often chalky, though these are not included in Mr. Tansley's ecological survey of the vegetation, a survey which, for the Heath itself, is remarkably thorough. Mr. Tansley's chapter and that by Mr. Hugh Boyd Watt, on the trees and shrubs of the district, give an admirable picture of the present state of the area from the botanical side, the latter including cultivated trees, many of which, especially those at Ken Wood, are of considerable interest. We notice that Mr. Watt enumerates some 190 kinds. The chapter on Flowering Plants other than trees strikes us as rather sketchy; and, though there are allusions to extinctions and introductions, it seems to us that an opportunity has been lost of placing

on record from materials which are in existence, such as Johnson's *Ericetum* and Trimen and Dyer's *Flora of Middlesex* (1869), a history of the progressive diminution of the wild flowers of Hampstead. Mr. Tansley seems curiously ignorant of the almost entirely recent and artificial character of the vegetation in and around the ponds.

The chapters dealing with animal life seem well done ; and, among the various photographic illustrations of individual trees, that of a Cornish Elm in Hampstead Cemetery strikes us as the most characteristic. The general get-up of the book is excellent, and we have noticed but very few misprints, and those of a trivial character.

"Beautiful Flowering Trees and Shrubs for British and Irish Gardens." By J. Weathers, F.R.H.S. With 33 full-page coloured plates by John Allen. 8vo., 152 pp. (Simpkin, Marshall, London, 1913.) Cheaper re-issue, 1*s.* 6*d.* net.

There is nothing new in this volume and the title hardly upholds the contents, for many of the trees, such as the elm, poplar, and oak, cannot by the greatest stretch of imagination be called beautiful-flowering. The lists of trees and shrubs, varieties in particular, are very incomplete, and the descriptions quite inadequate for the purpose of recognition. No doubt the book will be useful to amateurs, but what is really required is a comprehensive illustrated volume dealing with the really ornamental flowering trees and shrubs. Those already published, though much in advance of the present book, are hardly sufficient for the cultivator.

Why is *Actinidia chinensis*, the hardiest and best for English gardens, omitted from this genus, or *Castanopsis* and *Pyrus lobata* from the list of shrubs that are suitable for town planting ?

The book is well illustrated and nicely printed.

"Garden Work : A Practical Manual of School Gardening." By Wm. Good, F.R.H.S. 8vo., xvi + 399 pp. (Blackie, London.) 3*s.* 6*d.* net.

This is the same book as the author's "Garden Work" reviewed on p. 244, with the addition of an appendix on School Gardening, containing some excellent hints on the method of teaching gardening in elementary schools. In it the author rightly emphasizes the great importance of having the right type of teacher, the first requisite of successful education.

"Insects : their Life-Histories and Habits." By Harold Bastin. 8vo., xii + 349 pp. (Jack, London, 1913.) 7*s.* 6*d.*

There has been no book recently written dealing solely with the insect world in general in a popular fashion, and this one will therefore be sure to find a ready market. The opening chapters deal with structure and life-histories of insects in general, and their classification. Those following relate some of the particularly interesting parts which insects play in the world, their curious and often highly organized social relationships, and the remarkable protective and aggressive

devices with which they are furnished. The well-written text, clearly and well printed, is helped out by series of excellent plates, among which are some remarkably good examples of colour-printing.

"Flowerless Plants: how and where they grow." By S. L. Bastin. 8vo., xi + 152 pp. (Cassell, London, 1913.) 6s. net.

There are several popular books dealing particularly with ferns and the larger fungi, but mosses and liverworts are generally left out entirely, and algæ and lichens even more often. The present book supplies this deficiency, and includes notes on fungi and ferns as well. Numerous half-tone and four coloured plates accompany the text.

"The Propagation and Pruning of Hardy Trees, Shrubs, and Miscellaneous Plants." By J. C. Newsham, F.L.S. 8vo., xiv + 224 pp. (Crosby Lockwood, London, 1913.) 6s. net.

Plant physiology forms the text of the opening chapter of this well-illustrated book. It is a pity, however, that the illustrations are so far removed from the text to which they apply. The general physiology is dealt with briefly and accurately, but not always clearly. The use of shorter sentences (we counted one hundred words in one) would have tended to greater lucidity. The same remark applies to other parts of the book. There is a general looseness of expression, as though the writer were in haste, and as a consequence the meaning intended is often difficult to apprehend. Two examples of this will suffice: "The planting of apple trees, although meriting considerable care, is often carried out on too lavish a scale, particularly where a few trees are being dealt with; if the simple rules as given on page 65 are adhered to, this is all that is necessary" (p. 90). (There are no rules, by the way, on p. 65.) Again, on p. 91 we read: "Excessive or close pruning has been overestimated, and exaggerated in many instances, principally due to the lack of experience on the part of some enthusiastic writers on the subject."

Surely, in these days when there are already books on every subject, there is no need for great haste and slovenly writing in bringing out a book of this kind, conceived as it has been on such excellent lines.

Nothing but hasty preparation can account for the curious selection of special examples of trees and shrubs with the propagation of which the last part of the book deals. We find *Lindera* but not *Lavandula*, Southernwood but not Rosemary, *Leucothoë* but not *Zenobia*. There is rather more than the usual crop of wrong spellings of plant names. *Plantanus*, *Liriodendrum*, *Maclura dioicaspidata*, *Atlantus*, *Xanthoxylaceæ*, Mazereon, Liqustrum, *Myrica* (should be *Myrcia*, and *Pimenta acris* does not belong to the Myricaceæ but to Myrtaceæ), *Artemisia absynthium* (for *A. Abrotanum*), Laurel (for *Laurus*), *Aviatus nerdo*, *Stephanotis floribundis*, and Gesneries can all be guessed at, but what can *Codemus* be? Is it meant for Codiæums?

It is greatly to be hoped that the author will have an opportunity of revising this book before long, as its scheme and possible scope are such as to make it a valuable book to gardeners of all types.

NOTES ON RECENT RESEARCH

AND

SHORT ABSTRACTS FROM CURRENT PERIODICAL LITERATURE, BRITISH AND FOREIGN

AFFECTING

HORTICULTURE & HORTICULTURAL SCIENCE.

THE endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural periodical literature, has met with much appreciation. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

There are still, we feel, some departments of Horticulture and Horticultural Science very imperfectly represented in these abstracts, and the Editor would be grateful if any who have time at command, and who are willing to help in any special direction in this work, would communicate with him. He desires to express his most grateful thanks to all who co-operate in the work, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* renders subsequent reference to the original easy. The order agreed on is as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed ; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal, &c., in which the original article appears, taking care to use the abbreviation which will be found on pp. 263, 264.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP IN THIS WORK.

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Wilson, Gurney, F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault.	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Beiheft zum Botanischen Centralblatt	Beih. Bot. Cent.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Bollettino della R. Società Toscana d' Orticultura	Boll. R. Soc. Tosc. Ort.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Butt. Bot. Dep. Trin.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from U.S.A. Herbarium	Contr. fr. U.S.A. Herb.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr.W.I.
Journal of Agricultural Science	Jour. Agr. Sci.
Journal of Botany	Jour. Bot.
Journal of Chemical Society	Jour. Chem. Soc.
Journal of Economic Biology	Jour. Econ. Biol.
Journal of Economic Entomology	Jour. Econ. Entom.
Journal of Genetics	Jour. Gen.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal of the Society of Chemical Industry	Jour. Soc. Chem. Ind.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
La Pomologie Française	Pom. Franç.
Le Jardin	Le Jard.

Lebensgeschichte der Blutenpflanzen Mitteleuropas	Lebens. d. Blutenpfl.
Mycologia	Mycologia.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.
Oesterreichische Garten-Zeitung	Oester. Gart. Zeit.
Orchid Review	Orch. Rev.
Orchis	Orchis.
Phytopathology	Phytopathology.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Quarterly Journal of Forestry	Quart. Jour. of Forestry.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
Transactions Royal Scot. Arboricultural Soc.	Trans. Roy. Scot. Arbor. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc. †
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.
† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Alpine Plants, Manure for. By J. B. Farmer (*Gard. Chron.*, p. 318 ; October 26, 1912).—Advocates the use of a teaspoonful of phosphate of potash to a square yard, strong and hard as well as vigorous growth having resulted from such treatment, especially with plants in moraine soil.—*E. A. B.*

American Gooseberry Mildew. By F. Hammond (*Garden*, p. 575, Nov. 16, 1913).—The white felt-like mycelium attacks the growing tips of the shoots in May and June. This is the summer stage, violently infectious. Later the felted white mycelium turns a brown colour and resting spores are produced. These do not spread the infection at the time. It is because the resting spores fall to the ground that the Board of Agriculture insist on pruning the affected bushes being completed early. At first the Board recommended that the tips of the shoots affected with the disease in its summer stage should be removed at once. The shoots so pruned often shot again and were diseased. Summer pruning is not now recommended, but it may be practised when there is no danger of the pruned shoots breaking.

Another remedy is spraying either by strong water washes of 6 lbs. of copper sulphate to 100 gallons of water or by dilute summer sprays when growth is active ; these may be liver of sulphur ½ oz. to 1 gal. water. Bordeaux mixture (preferably as paste) 1 lb. to 10 gallons and lime sulphur, which must be used with caution. At present it is unsafe to spray 'Berry's Kent' and 'Yellow Shingle' with lime sulphur at standard summer strength, but 'Warrington' and 'Whinham's Industry' were unhurt, while 'Lancashire Lad' may be safely sprayed with half strength. Another method is the application of fine ground sulphate of iron round the plants, using 1½ oz. to the square yard.

H. R. D.

Andropogon. By A. S. Hitchcock (*Bot. Gaz.*, p. 424 ; Nov. 1912). —Describes a new species from Haiti.—*G. F. S. E.*

Anemone blanda scythinica. By E. A. Bowles (*Garden*, p. 339, July 6, 1912, ; fig. p. 340).—Those who cannot obtain or retain *Ranunculus anemonoides* are advised to substitute *Anemone blanda scythinica*. In its satiny white purity at full expansion it is very much like the *Ranunculus*, but when closed the backs of the sepals are deep blue instead of flushed with rose as in the *Ranunculus*. *Anemone blanda scythinica* is most beautiful when half expanded ; it is a free seeder, and soon spreads in the rock garden or border.—*H. R. D.*

Animals, Plant Names from. By H. N. Ellacombe (*Gard. Chron.*, pp. 257–8, 281–2 ; October 5 and 12, 1912).—A concise and scholarly review of the real and fancied connexions between plants and animals, followed by lists of plant names derived from those of birds and bird life, beasts, fishes, reptiles, molluscs, insects, and crustaceans.—*E. A. B.*

Apple, A New Fungus on. By J. W. Roberts (*Phytopathology*, ii. pp. 263–264 ; Dec. 1912).—A fungus to which the name *Phomopsis mali* is given was isolated from canker wounds on apple stems, and a description is now published. The author attributes the "canker" on "Yellow Newtown Pippin" to the fungus which also attack sthe leaves and occasionally the fruits.—*F. J. C.*

Apple Diseases and their Treatment, Some. By Charles Brooks (*U.S.A. Exp. Stn., New Hamp., Bull.* 157 ; April 1912).—The following are described, and remedies given when known :—

Apple scab, *Venturia Pomi*, causes spots on fruit and leaves. Fresh apples can be infected from diseased fruits when stored. This disease can be controlled by spraying with Bordeaux mixture, before the leaves unfold, after they have expanded, and thirdly after most of the petals have fallen. If the disease is serious a fourth and fifth spraying are recommended.

Fruit Spot, *Phoma Pomi*—causing black spots on the fruit. The tissue of the apple beneath the spot becomes corky. The spots spread in storage. Orchards which have been sprayed for scab three times do not usually require any later sprayings for fruit spot.

Bitter Pit—the cause is unknown.

Sooty Blotch and Fly Speck, *Leptothyrium Pomi*. Causes blotches on the fruit, giving the apple a sooty appearance. The fungus growth is entirely on the surface of the apple. The disease is especially dependent on moist weather, but is readily controlled by spraying.

Apple Rust, *Gymnosporangium* spp. This disease has two hosts ; the æcidial stage is on the apple leaf, and the teleutospore stage on the juniper. Spraying is not of much use. The best means of control is to destroy the junipers in the neighbourhood of the orchard.

Black Rot, Canker and Leaf Spot, *Sphaeropsis Malorum*. Very common in America. The fruit turns dark brown or black in colour, but remains firm. The disease is primarily a rot of ripe fruit, but may be found on immature fruit. It also attacks the branches, forming cankers. The limbs may be so nearly girdled by the cankers that they die. Disease first makes its appearance on the very young leaves, forming small purple areas, which become yellowish-brown in colour. Spotted leaves fall early. Spraying has proved effective in controlling this disease. The sprays should be applied as for scab.

Bitter Rot, *Glomerella rufomaculans*. This produces cankers on the limbs and rot in the fruit, accompanied by bitter taste. It is very destructive in some parts of America.

Fire Blight—a bacterial disease due to *Bacillus amylovorus*. This

is a very serious disease of pears in America. The disease may start in the blossom or tender twigs, and spread and kill the entire year's growth.

Crown Gall, *Pseudomonas tumefaciens*, also a bacterial disease, which affects the stem near the surface of the soil. It is contagious, but no remedy is known except the planting clean healthy stock, with no abnormal growths about the region of the collar.

European Apple Canker, *Nectria ditissima*. This disease is not serious in America.

Blister Canker, *Nummularia discreta*. Usually found on larger limbs and sometimes attacks the trunk, both the wood and bark. As the summer advances circular fungus masses, known as stromata, develop on the diseased area, and are formed beneath the bark.

The author then goes on to describe the appearance of injury due to spraying on apple trees.

Lime sulphur sprays do not cause so much injury to foliage and fruit as Bordeaux mixture, and seem to be equally effective. The symptoms of spray injury are as follows :—

On the leaves purplish-brown spots of various shapes and sizes appear—usually smaller, more irregular in shape, and more thickly distributed than spots due to disease. Soon after the appearance of the spots the leaves may turn yellow. In bad cases the leaves fall.

On the fruit small black or brown spots occur, scattered thickly over the apple ; later these spots become corky and russeted. In serious cases the apple becomes very much deformed or roughened. Slightly affected fruit can outgrow its injuries completely before picking.

Directions for making the sprays mentioned in the bulletin are given at the end.—*D. M. C.*

Apple Mildew. By F. E. T. (*Garden*, p. 404, Aug. 10, 1912).—According to the Board of Agriculture Leaflet, No. 204, the winter or ascigerous form of fruit of this fungus is very rare. The author thinks this is not the case, having found the ascigerous form on the fruits of the apple.

Dissemination of the disease is no doubt due to the profusion of conidial spores, readily dispersed by the wind. Occasional spraying, while the disease is active, with sulphide of potassium will be found an effective remedy.

As the mycelium of this fungus is also believed to be present in the bark of affected shoots, young shoots known to be affected should be cut back in winter and burnt.—*H. R. D.*

Apple Orchard on the General Farm, The Profitable Management of the Small. By M. C. Burritt (*U.S.A. Dep. Agr., Farm. Bull.* 491, April 1912 ; 8 figs.).—Surveys have been made in several of the leading apple-producing counties in western New York and data secured from about 11,000 acres of orchards. Most of these orchards are from 30 to 40 years old, and though not well treated in early

life they have been in a sense renovated, and now show average yields of 50 to 225 bushels an acre and an average gross income of $37 to $175 an acre, results which are considered more favourable than would ordinarily be expected from farm orchards in non-fruit-growing districts. The cost of renovation varies from $30 to $57 an acre, and the income may be expected to be well in advance of the cost after the first year.—*A. P.*

Apple Orchard Survey of Niagara County. By M. B. Cummings (*U.S.A. Exp. Stn., Cornell, Bull.* 262, Jan. 1909; 15 figs.).—Based on field studies of 716 orchards covering 6,000 acres, the majority of the orchards being from 35 to 45 years old. The average yield an acre for five years was 102 bushels, and the average gross income an acre $100. The chief varieties grown are 'Rhode Island Greening,' 'Baldwin,' and 'Northern Spy.'—*A. P.*

Apple Orchard Survey of Ontario County. By H. M. Martin (*U.S.A. Exp. Stn., Cornell, Bull.* 307, Nov. 1911; 3 plates, 8 figs.).—Numerous tables based on reports from 301 orchards covering an area of 2,700 acres, the material collected being arranged from two standpoints—the general distribution of orchards according to the different factors enumerated, and the relations of different methods of management to yield and income. The four-year average yield from an acre was 58·4 barrels and the income $111.51 (p. 172). The greatest yield was produced by orchards between 25 and 29, and between 50 and 59 years old, but the largest income by those between 40 and 44 years old (p. 183). The soils which produced the heaviest yields were the sandy loams (p. 189). More than half the orchards were essentially unsprayed, the four-year average income from these being $97.66 an acre, while from those sprayed three times a season the average income was $140.26 per acre (p. 202).—*A. P.*

Apple Rust Controllable by Spraying. By E. T. Bartholomew (*Phytopathology*, ii. pp. 252–257; Dec. 1912).—Apple rust due to *Gymnosporangium juniperus-virginianae*, which has for its alternate host *Juniperus virginiana*, seems to be increasing in the States with the increased planting of the red cedar near apple orchards. It is considered that certain apples, of which a list is given, are more susceptible to the rust than others, and it is advised that resistant varieties should be grown. Spraying (in a single season's experiments) of the variety 'Wealthy' which is most susceptible, was found to give beneficial results, but the time of carrying out the operation with hope of success depends on the time of maturity of the fungus on the cedar. Bordeaux mixture was used, and this reduced the amount of infection by a great amount. Three sprayings were given. It would appear that the spores of the fungus are able to be carried naturally for at least a mile.—*F. J. C.*

Apple Rust, Control of, by Spraying. By N. J. Giddings and D. C. Neal (*Phytopathology*, ii. pp. 253-260; Dec. 1912; plate).—In W. Virginia, 'York Imperial' and 'Rome Beauty' were the varieties suffering most. In this series of experiments the former variety and 'Ben Davis' were used. Bordeaux mixture, lime-sulphur, and atomic sulphur (7 lb. to 50 gals. water) were used. Only one spraying was given. All three sprays were effective in controlling the rust, but the degree of success depended upon the time of application. The authors consider it necessary to bear in mind when spraying for this pest, the condition of the cedar apples, the condition of the apple foliage, and the condition of the weather.—*F. J. C.*

Apple Trees, Hints on Pruning. By J. C. Whitten (*U.S.A. St. Bd. Hort., Missouri, 4th Ann. Rep.*, 1910, pp. 172-7; 2 figs.).—One remark at least in this paper is worth quoting: "Even the man who prunes with the greatest skill cannot accurately tell another man how to prune an apple tree."—*A. P.*

Apples, Experiments in Breeding. By Hedrick and Wellington (*U.S.A. Exp. Sta. New York, Bull.* 350, 186 pp.; 17 pl.).—A record of experiments in breeding certain apples, and of special value, as a number of each specific cross were made. As an example, 'Esopus' × 'Ben Davis,' 29 trees were fruited, all of which showed variety in mingling of the respective characters of their parents, and some resembled one parent almost exactly. Some showed external characters of 'Esopus,' and internal characters of 'Ben Davis.' In some other crosses the hybrid exactly reproduced one parent. No uniform dominance appeared. These facts are very suggestive that apples will generally breed true, though the difficulty of selfing them renders proof almost impossible. A further point is the fact that nearly all seedlings showed a very thorny and crab-like appearance at first, which they after grew out of. A popular edition of this Bulletin, omitting tables and plates, is also published.—*E. A. Bd.*

Apples in Boxes, The Packing of. By C. S. Wilson (*U.S.A. Exp. Sta., Cornell, Bull.* 298, May 1911; 8 figs.).—A full description of Western methods of packing and marketing apples. Not only should all boxed fruit be first-class, but it should be graded into three different sizes and each size packed by itself, the box and the method of packing being adapted to the size of the fruit. The grading of fruit is done by men trained to the work, and beginners are advised to use a sizer or grader consisting of a thin board through which holes of the correct diameter have been made. A table is given which was used in the famous Hood River Valley, Oregon, in 1910, showing the pack, the number of tiers, the number of apples in a row, the box to use, and the number of apples in the box.—*A. P.*

Araucaria, Morphology of. By L. L. Burlingame (*Bot. Gaz.*, pp. 97-114; Feb. 1913; with 21 figs. and 2 plates).—The author states

that at Linden Towers there are numerous specimens of *Araucaria* of four species, including three individuals of *A. brasiliensis*, which last are about thirty years old and 25 to 60 feet in height. The largest is about 20 inches in diameter.

One terminal bud may produce 1000 spore leaves, each with 10–15 sporangia bearing 500–1000 pollen grains, so that there may be a billion pollen grains.

The author finds the dehiscence structures very like those of ferns.

The sperm cells are very large (150 μ or more in length) and possibly motile.

The evidence "goes far towards inducing a belief in the primitive condition of the Araucarians."—*G. F. S. E.*

Arsenite of Zinc and Lead Chromate as Remedies against the Colorado Potato Beetle. By F. A. Johnston (*U.S.A. Dep. Agr., Bur. of Entom., Bull.* 109; April, 1912).—The best results were obtained by using 2 lb. arsenite of zinc to 50 gallons of water. Lead chromate, which settles far more rapidly than the zinc chloride, gave much less satisfactory results (1 oz. to 1 gallon of water was used).—*F. J. C.*

Arundo tenax, To Make Seed Pots of. By Dr. G. V. Pérez (*Jour. Soc. Nat. Hort. Fr.*, 4th Series, vol. xiii., p. 717, Nov. 1912).—A note on the use of lengths of the stems of *A. tenax*, in place of earthenware pots, for seedlings and cuttings. The lengths may vary in size according to the use to which they are to be put, and the writer contends that they take up no room, are less easily broken; and the transported contents suffer much less than when ordinary pots are used.—*M. L. H.*

Azalea indica, 'Mme. Jean Haereus.' By L. de Nobele (*Rev. Hort. Belge*, No. 4, p. 57, Feb. 15, 1912; plate).—This variety of *A. indica*, first shown at Charleroi in 1907, is said to be magnificent in colour and size, and to possess every quality which can be desired in a commercial or amateur's Azalea. It lasts long in bloom, is hardy, easily reproduced, and the petals are not at all inclined to drop.—*M. L. H.*

Bog Plants. By Alfred Dachnowski (*Bot. Gaz.*, pp. 503–514; Dec. 1912).—The author discusses the various possible causes which may limit the development of ordinary plants in peat bogs.

Evaporation in a bog-forest averaged 8·1 c.c. daily, and corresponds to that found in a beech maple forest. In a bog meadow it was less (10·9 c.c.) than that found in an open field (15·8 c.c.). Neither substratum temperature nor difference between air and soil temperature can act as selective factor for the plants able to grow in bogs. Osmotic pressure is very nearly alike in the various plant zones in a bog, and is much the same as found in lake and river water. Nor does variation in the position of the water table influence the vegetation. In poorly decomposed bog-meadow peat the percentage of volatile matter is high, whilst that at fixed carbon, nitrogen ash, is low (the reverse is

found in well-decayed peat carrying a bog forest). There are also sufficient mineral salts and nitrogen material (nitrites, nitrates, and ammonia).

The author found extraordinary differences in the transpired amount, and green weight produced in varieties of the same plant (*Sorghum, Medicago, Dolichos, Phaseolus*, and wheat).

He concludes that the bacterial flora and the nature of the organic compounds produced are very important factors. The condition of the plant itself and the fact that certain organic compounds penetrate the protoplasmic membrane are also of great importance. Some plants precipitate the organic compounds in peat, whilst others absorb and assimilate them. These organic disintegration substances have little or no effect upon certain xerophytic plants.—*G. F. S. E.*

Borders, Herbaceous, of London Parks. By E. Richlin (*Die Gart.* p. 104; Feb. 22, 1913).—The author, a Continental visitor, describes and illustrates in great detail the famous herbaceous border in Greenwich Park. The visit happened five months after the border had been first planted, at the end of the summer of 1912. Grouped in clumps of about three to five plants of each kind, with careful blending of colours, nearly all the plants flowered and were at their best, showing great care, foresight, and knowledge of the subject. Another, though much smaller, group near the lake contained several of the rare and somewhat difficult *Meconopsis* of the Himalayas and China, with a number of the vigorous-growing Primulas.—*G. R.*

Botrychium, The Abortive Spike of. By O. O. Stoland (*Bot. Gaz.*, pp. 525–531; Dec. 1912; with 21 figs.).—The author describes and figures the anatomy of the abortive spike, and considers that it represents two fused basal pinnæ.—*G. F. S. E.*

Bowenia, Two species of. By C. J. Chamberlain (*Bot. Gaz.*, pp. 419–423; Nov. 1912; with 4 figs.).—The author makes a new species of the variety *serrulata* of *B. spectabilis*, Hook. f. This species forms a dense underbrush in the prevailing *Eucalyptus* bush near Rockhampton, Australia. The stem is spherical or turnip-shaped, and not carrot-shaped as in *B. spectabilis*.—*G. F. S. E.*

Brambles, Ornamental, for Winter Effect (*Garden*, p. 624, Dec. 14, 1912; and 2 figs.).—Mr. E. H. Wilson, during his three expeditions in China, collected seeds of fifty species and varieties of Rubus; of these at least ten or twelve already give evidence of becoming popular. The different species and varieties vary very much in growth, foliage, and appearance. Several form large bushes 12 or 15 feet high, others produce long, slender, trailing stems.

The three most noteworthy of the better fruiting kinds are *R. biflorus*, *R. quinqueflorus*, and *R. Kuntzeanus*. The species with trailing shoots are suitable for pillars and pergolas, particularly several of the evergreen species. The species with ornamental stems or

foliage are valuable for shubbery borders, beds, or groups in woodland walks. When planting the white-barked brambles, eight or ten plants should be grouped together to get the best effect.

A selection with attractive stems in winter are: *R. biflorus*, *R. quinqueflorus*, *R. Geraldianus*, *R. lasiostylus*, *R. mesogaeus*, and *R. tibetanus* (*Veitchii*). Evergreen trailing species are *R. bambusarum*, *R. flagelliflorus*, *R. Parkeri*, *R. Playfairianus*, and *R. Swinhoei*. The best of the deciduous species are *R. Geraldianus* and *R. tibetanus* (*Veitchii*).—*H. R. D.*

Breeding, Heterozygosis in. By East and Hayes (*U.S.A. Dep. Agr., Bull.* 243, 58 pp.; 8 pl.).—A valuable study of the increased vigour often seen in hybrids, and a study of its possibilities in commercial culture as a means of augmenting crops. It is pointed out that in breeding naturally cross-fertilized species gives the same result and is due to the same cause, viz. heterozygosis.

Tobacco and Maize are mainly dealt with, but a discussion of the historical and theoretical aspects generally is included. A bibliography and index are included.—*E. A. Bd.*

Burgundy Mixture, How to prepare. By M. Cochet-Cochet (*Jour. Soc. Nat. Hort. Fr.*, ser. iv., xiii. p. 266; May 1912).—For use on Roses Burgundy mixture is said to be a great improvement on Bordeaux mixture. It is prepared as follows:

Water . . . 100 litres
Sulphate of copper 2,000 grammes
Carbonate of soda 1,500 grammes.

Take a perfectly clean wooden barrel capable of holding 110 litres. Pour in 50 measured litres of water. Put the sulphate of copper in a thin cloth or an old basket and suspend it in the barrel so that it is just covered by the water. In a few minutes the sulphate will be dissolved. Dissolve the carbonate of soda in the other 50 litres of water and pour gently into the barrel, stirring constantly. If all the ingredients are pure the mixture should be neutral or at least slightly alkaline. This purity cannot, however, always be relied on, and the mixture should be tested with an alcoholic solution of phenol-phthalein for excess of acid. If this is present it should be neutralized by the addition of more carbonate of soda.—*M. L. H.*

Cabbage and Related Crops, Diseases of. By L. L. Harter (*U.S.A. Dep. Agr., Farmers' Bull.* 488; 1912).—The author devotes several pages as to the manner in which the various diseases, both bacterial and fungoid, are disseminated, by insects, infected seed, transplanting from infected seed beds, drainage water, manure, compost, animals, and wind.

He urges preventive measures rather than curative measures, such as sterilization of seed and soil with formalin. For the soil drench he prescribes 1 part formalin in 100 or 200 of water, applied at the rate

of three quarters of a gallon to each square foot of seed bed. An interval of several days should be left before sowing. Where possible, a method of steaming soil by means of an inverted galvanized iron pan, 6 by 10 feet and 6 inches deep, under which steam is admitted, gives very satisfactory results. Considerable steam pressure is necessary, about 80 to 100 pounds, for half an hour after the soil has reached a temperature of 212° F. This of course can only be done in houses or on seed beds. The diseases of cabbage discussed in this bulletin include eelworm attacks, bacterial and fungoid diseases, the most important being clubroot; black rot, which dwarfs and sometimes entirely destroys the heads of cabbage, and is generally worse on one side; black leg or foot rot, which causes the whole plant to wilt; and damping off of seedlings and many others.

Some of these diseases are very difficult to control, but this bulletin does much to help the American farmers in recognizing the dangerous diseases of cabbage when they occur. Several plates are given.

D. M. C.

Caladium tuberosum, The. By Nestor Seghers (*Rev. Hort. Belge*, No. 21, p. 329, Nov. 1, 1912; No. 22, p. 345, Nov. 15; No. 23, p. 362, Dec. 1).—Three articles on the Caladium from its first appearance in the pages of the "Hortus Kewensis" in 1789, where it was described under the name of *Arum bicolor*. It had been discovered by Commerson near Rio de Janeiro in 1767, but was only introduced into England some years later. It was Ventenat, of the Jardin des Plantes in Paris, who first realized that this plant was not a true Arum, and the genus *Caladium* was established by him, and finally in its present signification by Schott. The dates and names of the producers of some of the later magnificent hybrids are here given.—*M. L. H.*

Carnations, Fertilisers for. By David Lumsden (*U.S.A. Exp. Stn., New Hamp., Bull.* 159; 1912).—A series of incomplete experiments on carnation feeding; bone meal giving best results on the whole.—*G. P. C.*

Catalpa, Polystictus versicolor as a Wound Parasite of. By N. E. Stevens (*Mycologia*, iv. pp. 262–270; Sept. 1912; 2 plates).—This common fungus is reported as the cause of the only serious disease of Catalpa in the States. It fruits abundantly on the living tree, and rarely on the dead. The fungus in stumps of Catalpa appears not to infect the young vigorous shoots from the base of the stump very readily until after their most rapid growth has ceased.—*F. J. C.*

Catalpa, The Hardy. By Chas. A. Scott (*U.S.A. Exp. Stn., Kansas, Circ.* 20).—This is the only species worth planting as a timber-producing tree, and is usually worked on a sixteen or eighteen years' rotation. Seasoning must be attended to before the timber is

put in use, it being principally converted into fencing posts. As a commercial undertaking Catalpa growing has in the States proved a good financial investment.—*A. D. W.*

Chestnut and Oak, Large Leaf Spot of. By A. H. Graves (*Mycologia*, iv. pp. 170–174; July 1912; 1 plate).—*Castanea dentata* and *Quercus rubra* were both affected by a leaf spot disease forming small pale spots with a darker margin, rather variable in colour, on otherwise healthy leaves. Concentric rings of growth appear and finally the spots become much larger, up to about 2 inches in diameter and stretching across the entire width of the leaf. The fungus was isolated and proves to be *Monochaetia Desmazierii*. Spraying where individual trees are attacked is recommended, but raking up and burning fallen foliage is also a measure likely to prove useful.—*F. J. C.*

Chestnut Bark Disease, The Control of. By Haven Metcalf and J. Franklin Collins. (*U.S.A. Dep. Agr., Farmers' Bull.* 467).—The bark disease of true chestnuts belonging to the genus *Castanea* is due to an ascomycetous fungus, *Diaporthe parasitica*. It is causing very considerable damage to chestnuts in the United States, and is believed to have been imported from Japan. The fungus is a wound parasite, lives in the bark, and very soon kills the tree by girdling the trunk or branches where infection occurs.

The summer spores are extruded from orange-yellow or reddish-brown pustules, in the form of long, irregularly twisted strings or "horns," bright yellow to greenish-yellow in colour. The pustules occur on the dead, discoloured, sunken areas on the bark. After the trunks have been girdled, the fungus grows extensively in the bark and the ascus or winter stage is formed, consisting also of reddish-brown pustules. Sprouts and suckers develop below the diseased areas, and form a very characteristic symptom.

No sprays seem to be of any avail. The disease can only be controlled by cutting down and burning badly diseased trees and cutting out diseased areas in slightly affected trees, by quarantine and elimination, and by locating advance infections by careful examination of trees.

The timber which does not seem to be affected of diseased trees can be used, but all bark must be carefully burned, to prevent the spread of the disease.—*D. M. C.*

Chestnut Blight. By P. Spaulding (*Mycologia*, iv. pp. 148–149; May 1912).—This disease has spread rapidly during the past three years so as to be beyond hope of control in parts of Connecticut. The imperative need for immediately controlling the disease when it first appears is pointed out, and the fact that the characteristic symptoms of the "blight" are due to the girdling of the trunk by the fungus is pointed out.—*F. J. C.*

Chestnut Blight Fungus and its Allies. By G. P. Clinton (*Phytopathology*, ii. pp. 265–269 ; Dec. 1912).—A further communication on the fungi belonging to the genus *Endothia* (including that known as *Diaporthe parasitica*) occurring on the chestnut, etc. They are *Endothia radicalis*, found in N. America ; *E. gyrosa* (Schw.) Fr., which the author regards as the same as Anderson's *E. virginiana* (q. v.), and of which he believes he has discovered Schweinitz's type, found in Europe, etc. ; and *E. gyrosa* var. *parasitica* the cause of the American chestnut bark disease.—*F. J. C.*

Chrysanthemums, New Grouping of. (*Jour. Soc. Nat. Hort. Fr.*, 4th Series, vol. xiii., p. 812, Dec. 1912.—The Chrysanthemum section of this Society has revised the lists of the best chrysanthemums for 1913 and has grouped them under fifteen heads, early, late, large flower, incurved, branched, single, &c. The lists include several hundred varieties.—*M. L. H.*

Citrus Fruits, Stem-end Rot of. By H. S. Fawcett. (*U.S.A. Exp. Stn., Florida, Bull.*, 107, 1911).—This disease, which is due to a fungus, *Phomopsis* sp., causes premature fall of the fruit of Citrus trees, decay in transit and storage, and kills back twigs of the trees. Its presence is indicated when the fruit drops, and softens at the stem end. As the softening advances and enlarges, the rind turns brownish in colour, becomes soft and sticky. In the interior of the fruit the decay spreads along the centre, where the segments join, and along the inner white part of the rind.

The spores of this fungus develop in pycnidia on mummified fruit, on dead branches and bark, and the fungus lives in the soil under infected trees.

The fungus can penetrate the sound fruit, as shown by a large number of inoculations.

Fungicides did not check the fruit from dropping and rotting in transit, nor was disinfection any use.

Remedial measures are pruning and burning all affected portions of the tree, careful handling, cooling in transit, and spraying against scale insects.

A short list with descriptive notes on other diseases of citrus fruits is given.—*D. M. C.*

Citrus medica, Wither-tip of. By R. E. Claussen (*Phytopathology*, ii. pp. 217–234 ; Dec. 1912 ; 2 plates).—Hitherto *Colletotrichum gloeosporioides* has been looked upon as the cause of wither-tip, but infection experiments failed to reproduce the fungus, and further investigation led to the discovery of a virulent parasite to which the name *Gloeosporium Limetticolum* has been given. An account of the infection experiments and a technical diagnosis of this new species form part of the paper, to which a bibliography is appended. For description of the disease, see *Journal R. H. S.*, xxix. p. 770.—*F. J. C.*

Codling Moth, Recent Experiments with. By E. P. Felt (*Jour. Econ. Entom.*, 5, 153–169 ; April 1912).—Accounts of experiments and a long discussion on the relative advantage of a single early spraying and frequent spraying against codling moth. It appears that the different atmospheric conditions obtaining in the eastern and western States call for different methods of spraying. This being so, no finality was reached in the discussion which took place at the annual meeting of State entomologists. In the eastern States one spraying with an arsenical spray within ten days of the fall of the petals was found to give the best results.—*F. J. C.*

Conifers in the Lower Congo. By R. Kinds (*Rev. Hort. Belge*, No. 21, p. 336, Nov. 1, 1912 ; plates).—A descriptive and illustrated list of the conifers at present growing in the grounds of the Jesuit Mission at Kisantu, on the Congo. These include *Araucaria Bidwilli*, *A. excelsa*, *Biota*, *Juniperus bermudiana*, and others. The conditions at the Mission are not by any means favourable, so it is much to the credit of Brother Gillet, who superintends the plantations, that these are able to contribute largely to the support of the missionaries and their pupils. From the point of view of the ordinary colonist it would lessen the importance of these favourable results if the trees were kept alive only through the constant care of Brother Gillet and his assistants. This, however, appears not to be so. Grown from seed in the colony and nursed through one dry season, the trees may safely be left afterwards to take care of themselves.—*M. L. H.*

Cotton, a Method of Inbreeding. By W. W. Gilbert (*Proc. Amer. Breeders' Assn.*, vol. 8, pp. 405–409 ; 1912 ; 2 figs.).—A less tedious method of protecting cotton flowers from foreign pollen than the old bag method was found in loosely winding No. 26 soft copper wire round the bud just before it begins to open at the tip. The flowers are self-fertile, and the loose coiling of the wire prevents the opening of the corolla to admit insects, but does not interfere with the development of the floral parts.—*F. J. C.*

Cotton-wilt and Root-knot, the Control of. By W. A. Orton and W. W. Gilbert (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ.* 92 ; March 1912 ; figs.)—Root-knot due to the eelworm *Heterodera radicicola* is very common in this country on a variety of plants, and Cotton-wilt due to a *Fusarium* is one of the main troubles in the cotton-growing States of America. The cotton-wilt fungus is confined to the cotton and okra and is usually found associated with root-knot. Varieties of cotton have been secured resistant to wilt, but resistance to root-knot has not yet been obtained. Rotation of crops is the main thing to use to gain ascendancy over the latter pest. Lists of immune plants and of those commonly attacked are given, together with an account of experiments towards securing wilt-resisting cotton plants. —*F. J. C.*

Crataegus, New Arborescent. By J. Dunbar (*Gard. Chron.*, p. 114; Feb. 22, 1913; fig.).—Thirteen species of the Crus-Galli group described.—*E. A. B.*

Creosote, The Absorption of, by the Cell-walls of Wood. By Clyde H. Teesdale (*U.S.A. Dep. Agr., For. Serv., Circ.* 200; Sept. 14, 1912).—This gives the results of numerous experiments that have been carried out at the Yale Forest School Laboratory.

If the cell-walls absorb creosote, then a weakening effect similar to that produced by moisture in the wood is brought about; while, on the other hand, should the cell-walls not absorb creosote, timber treated by creosote should not suffer a decrease in strength, provided no chemical reaction takes place.—*A. D. W.*

Creosotes, Commercial: with Special Reference to Protection of Wood from Decay. By Carlile P. Winslow (*U.S.A. Dep. Agr., For. Serv., Circ.* 206; July 18, 1912).—An account of the various creosotes, including that of coal tar, water-gas tar, wood tar, and mixed coal tar.

Coal tar creosotes rank higher in value for the treatment of timber than that obtained from wood.—*A. D. W.*

Crown Galls on Sugar Beet, Etiology of. By E. F. Smith (*Phytopathology*, ii. pp. 270–272; Dec. 1912).—Spisar, in the *Zeitschrift für Zuckerindustrie in Böhmen*, claims that the crown galls of the sugar beet are due merely to callus formation following wounding. Dr. Smith here combats the statement, upholding the bacterial origin of the galls.—*F. J. C.*

Damping-off of Coniferous Seedlings, Use of Soil Fungicides to Prevent. By C. Hartley (*Proc. Soc. Amer. Foresters*, vii. pp. 96–99; March 1912).—The author found that watering with a dilute solution of sulphuric acid ($\frac{3}{16}$ fluid ounce to each square foot) destroyed the damping-off fungus, *Pythium Debaryanum*, and weeds, resulting in a greater percentage of germination, less loss of seedlings, and the destruction of weeds. Care had to be taken to water the beds thoroughly during growth. The nursery was of very sandy soil and the method would probably not be applicable to calcareous soils. The seedlings were those of *Pinus divaricata*.—*F. J. C.*

Daphnes and their Cultivation. By Henry Correvon (*Garden*, p. 104, March 2, 1913).—Though not all of easy cultivation, their very ornamental flowers, tufted growth, but above all their delicious perfume place the Daphnes in the first rank of rock plants. The different species or varieties are grown in gardens under all sorts of different names; *e.g. D. collina* has been found under six different names, *D. cneorum* under three or four. The following is a short review of the Daphnes in cultivation:

D. alpina, 1 to 3 feet, white; slightly-scented flowers, grows in calcareous rocks of the Alps or Pyrenees in full sunshine.

D. altaica differs by its erect growth; white.

D. arbuscula. There are two plants under this name, *D. Laureola* and a garden form of *D. cneorum.*

D. atropurpurea, Mezereum with purple-black leaves, a garden form.

D. Blagayana, an Austrian species, has attained large size at Edinburgh and Glasnevin.

D. buxifolia, a miniature *D. alpina.*

D. caucasica (*D. salicifolia*), distinguished from *D. altaica* by its taller stature (4 to 5-feet plants have been known).

D. Sophiae, between *D. altaica* and *D. caucasica,* leaves streaked white and green, flowers; white scented.

D. Gnidium, green flowers and ornamental foliage, grows in shade.

D. hybrida (*D. Dauphinii* × *D. Delphinii* or *D. indica*), an Asiatic shrub with glossy evergreen leaves and fragrant reddish-violet flowers.

D. Laureola, and its var. *Philippii* of the Pyrenees, grow in shade, green flowers and black berries.

D. pontica, nearly related to the last.

D. Mezereum is well known; the *D. odora* of Japan and its var. *D. japonica* are among the sweetest of the known flowers; the first has lilac, and *japonica* white flowers.

D. oleoides (Greece), related to *buxifolia.*

D. Pseudo-Mezereum, fragrant bright orange flowers.

D. rupestris or *petraea,* flowers clear carmine, bushes dwarf and close-growing.

Propagation is by seeds, which take a year to germinate, by cuttings, layers and grafting.

They will all strike from cuttings. *D. indica* is the most difficult, and may take two years to form roots. *D. rupestris* is the easiest.

H. R. D.

Dianthera americana, Black Knot Disease. By I. M. Lewis (*Mycologia,* iv. pp. 66–71; March 1912; 4 plates).—Hypertrophied areas occur on the internodes, and later the bark cracks and exposes the causal fungus; the surface becomes later distinctly roughened and papillate, and the colour, at first grey, becomes jet black. The fungus causing the disease is new, and is named *Bagnisiela Diantherae.* A technical description is given.—*F. J. C.*

Digitalis, Some Hybrids of. By W. N. Jones (*Jour. Gen.,* II., pp. 71–88; figs. and plates).—Reciprocal hybrids were obtained between *Digitalis purpurea* and *D. grandiflora* (=*D. ambigua*). They are described and compared with the characters of the parents. It is concluded that, in general, the expression of any character in these hybrids is intermediate between its expression in the two parents, the reciprocals differing from one another in that each shows a greater resemblance to its seed parents, but in the case of some characters there is complete dominance in the hybrids irrespective of whether

these characters are derived from the paternal or maternal side. The reciprocals differed from one another, having some characters more like the seed parent, and various hypotheses as to the reason for this variation are considered. The hybrid is infertile but seed has been obtained from the hybrids by the use of pollen from the two parents.—*F. J. C.*

Diseases of Plants, International Campaign against. By Giuseppe Cuboni (*Rev. Hort. Belge*, No. 23, p. 370, Dec. 1, 1912).—A plea for some sort of combined international action in preventing the spread of plant diseases by infected nursery stock. It is suggested that an International Convention formed for this purpose might also do valuable work in encouraging and subsidizing a more scientific study of all the preventable diseases.—*M. L. H.*

Diseases, The Influence of Environmental Conditions upon the Development of Plants. By J. M. Reed (*U.S.A. St. Bd. Hort., Missouri, 4th Ann. Rep.*, 1910, pp. 138–154).—Fungi and bacteria are the principal causal organisms of disease in plants, and light, water supply, temperature etc., play an important part in their development and considerably affect the ability of the best plant to resist invasion (p. 139). Soil conditions are an important factor, the root rot of tobacco, for instance, being much more serious in an alkaline soil, while the use of acid fertilizers is effective in controlling the disease. The contrary is the case with club-root in the cabbage family and with the root rot of beets, both of which can be prevented to a great extent by liming (p. 141). In the case of asparagus rust an ample water supply causes such vigorous growth in the host that it can resist invasion by the rust, but a moist atmosphere and heavy dews aid spore germination and the growth of the mycelium of the fungus (p. 142). Carnation rust is much favoured if the leaves are wetted in the process of watering for the same reason. Infection by various green rusts is specially favoured by humid, showery, sultry days followed by damp nights, but where irrigation is practicable and there is an absence of dew, rust never causes serious injury to cereals (p. 144). Similar observations have been made with the black rot of grapes, the brown rot of stone fruits, the black rot of cabbage, the late blight of potatos, and larch canker (pp. 143–8).

The influence of temperature upon different diseases varies very much, the bitter rot of apples becoming a serious menace to the apple crop in very hot weather in the southern portions of the apple belt, and being soon checked by a period of cool weather, while peach-leaf curl is much more prevalent after a cold spell, and the germination of various rust spores has been found to be considerably aided through being subjected to cold for some hours. Chilling also favours infection, radish plants inoculated and then chilled for ten hours showing over 95 per cent. of infections, while only a small number of

plants inoculated and kept at ordinary room temperatures become infected (p. 149).

Light is of marked indirect importance in many cases, though it is considered doubtful if it has any direct effect upon the parasite (p. 150). Celery is damaged seriously by the early blight fungus when grown in strong sunlight, the disease appearing to develop best during bright hot days with dewy nights, but it is controlled to a considerable extent by partial shade. Most fungus diseases, however, develop best in shady conditions, especially the powdery mildews. Experiments with etiolated plants show opposite results. Petunias and lettuce in this condition were attacked by the hemi-parasitic fungus Botrytis, though the normal green leaves of these plants are not infected by it. On the other hand the rust which infects brome grasses could not do so when the grasses had become etiolated (p. 151).

A. P.

Diseases, Two Dangerous Imported. By P. Spaulding and Ethel Field (*U.S.A. Dep. Agr., Farmers' Bull.* 489).—The two disease fungi concerned are *Peridermium Strobi* and *Chrysophlyctis endobiotica*. The latter, so far, has not found its way into the United States, although it is known in Newfoundland.

Peridermium Strobi, or white pine blister rust, has its æcidial stage on the leaves of currants and gooseberries, and spreads from there on to the bark of *Pinus Strobus* and many other five-leaved pines. The stage on the pine is the more destructive of the two, and has caused so much damage to nursery stock, &c., that the use of the white pine has been discontinued in Denmark, and Holland and is largely given up in England.

The other disease, *Chrysophlyctis endobiotica*, or warty disease of potato, gains entrance into the tubers through the tender tissue at the eyes. In mild attacks the eyes first appear greyish, then brown, and finally turn black. In more advanced stages one or more nodules appear, varying in size from a pea to wrinkled coral-like lumps as large as or larger than the tubers themselves. The potatos are finally reduced to a black, pulpy, evil-smelling mass. The nodules are white when young, but turn black later. The organism develops in the tissues, forming summer thin-walled sporangia in the cells. These sporangia burst and liberate spores which infect other tubers. The winter sporangia are developed in the same way, but are thick-walled, and live through the winter either in the soil or in diseased tubers. In spring these sporangia ripen and liberate numerous motile spores.

The winter sporangia can remain viable for eight years, so that land, when once infected, should not be cropped with potatos for eight years or longer.

No remedies, so far, have proved effectual. Only clean seed from non-infected land should be planted, and great care should be taken not to feed diseased tubers, unless previously boiled, to stock, as the spores can pass through an animal unharmed, and infection has been

known to have been spread through manure of stock fed with diseased tubers.

Implements used on infected land should be thoroughly clean.

D. M. C.

Dombeya Mastersii. By W. T. (*Garden*, p. 3, Jan., 1912).—The genus comprises some thirty species of handsome evergreen shrubs or small trees, natives of Africa or the Mascarene Islands, and should be more generally cultivated. *D. Mastersii* is worth attention. There is a fine specimen planted out in the Temperate House at Kew. The fragrant pearly-white flowers, about 1 inch in diameter, are produced in axillary corymbs near the end of the loosely spreading branches; the leaves, heart-shaped and velvety, are 3 to 6 inches long and 2 to 5 inches wide. It commences to bloom in October, and continues through winter and early spring. Propagation by cuttings in March and April.—*H. R. D.*

Douglas Fir, Fire-killed, Damage to the Wood of: and Methods of Preventing Losses in Western Washington and Oregon. By A. D. Hopkins (*U.S.A. Dep. Agr., Bur. Entom., Circ.* 159; July 27, 1912).—Wood-boring insects play sad havoc amongst the trees of Douglas Fir that have been killed by fire. The general methods to avoid damage to the trees are prompt utilization of the timber within about a month after the fire, removing the bark and placing the logs in water.—*A. D. W.*

Douglas Fir, Fire-killed: A Study of its Rate of Deterioration, Usability, and Strength. By Joseph Burke Knapp (*U.S.A. Dep. Agr., For. Serv., Bull.* 112; Sept. 30, 1912).—As regards the value of timber that has been subjected to forest fires, the tests indicate that the sound wood from fire-killed Douglas Fir may safely be used for constructive purposes, and that its merits are nearly, if not quite, equal to those of material from green growing trees.—*A. D. W.*

Echium Wildpretii and Allied Species. By G. V. Perez (*Gard. Chron.*, p. 19; Jan. 11, 1913; 4 figs.).—Suggestion that useful crosses might be raised with our native *E. vulgare*.—*E. A. B.*

Ecology of Delaware Coast. By Laetitia M. Snow (*Bot. Gaz.*, pp. 45–55; Jan. 1913; with 6 figures).—The author revisited this district after an interval of ten years and notes the progress of coast erosion and the differences in vegetation during this period.—*G. F. S. E.*

Enzymes, Chlorides and Action of. By L. A. Hawkins (*Bot. Gaz.*, pp. 265–285; April 1913).—The author describes the effect of sodium, potassium, magnesium, iron and copper chlorides in various solutions (singly and combined) on the action of malt diastase on starch extract. Much variation was found. More or less pronounced acceleration of

starch hydrolysis is shown by all the salts used at different concentrations. The highest acceleration observed was that for iron (291 per cent.) and calcium (269 per cent.). Retardation of hydrolysis was shown at high concentrations for all salts excepting sodium chloride and potassium chloride. These last two produced a retarding action at low concentrations.

The author describes these effects to the various actions employed. *G. F. S. E.*

Endothia virginiana. By P. J. Anderson and H. W. Anderson (*Phytopathology*, ii. 261–262; Dec. 1912).—A description of the new fungus allied to the species causing chestnut bark disease and referred to in a previous communication (see *Journal R.H.S.*, vol. xxxviii. (1913), p. 632, also *ante*, pp. 274, 275) is given.—*F. J. C.*

Evaporation in Ravines and Forests. By George D. Fuller (*Bot. Gaz.*, pp. 424–426; Nov. 1912; with 1 fig.).—The author found that the average rate of evaporation at 25 cm. above the surface of the soil was 7·4 c.cm. daily throughout the season, and at 2 metres height 13·5 c.cm. daily. In a ravine 10 metres deep, the evaporation on the slope at 4 metres below the edge averaged 5·9 c.cm. daily.

So different levels in the same association may have very different conditions as regards humidity. The author points out that many beech seedlings die before reaching 6 feet in height, and that the ravine (above) contained many delicate forms unusual elsewhere.—*G. F. S. E.*

Exochorda Giraldi (*Die Gart.*, p. 450; Aug. 17, 1912).—A comparatively new, hardy shrub of erect growth and with ovate acute leaves 2 to 3 centimetres long, petioles long reddish. The flowers are erect in long racemes; white, tinged pink or rose.—*G. R.*

Exochorda Korolkowi (*Die Gart.*, p. 450; Aug. 17, 1912).—The flowers in this very little known species are sulphur-coloured, rarely greenish yellow, and the plant grows into a compact, handsome bush; flowering during April and May.—*G. R.*

Farmyard Manure, Chemical Composition as a Measure of Value. By C. Crowther and A. G. Ruston (*Trans. High. and Agric. Soc. Scotland*, xxiv., pp. 219–236; 1912).—Further evidence is given that the ordinary methods of estimating the value of farmyard manure are defective. The experiments described lead to the following conclusions: (1) The difference in composition between the manures produced by animals fed under the same conditions but on different rations may vary widely from that which the composition of the foods consumed would lead one to expect. This is especially the case where the amount of "roots" included in the rations differs greatly. (2) The chemical composition of the manures by itself is not a reliable measure of their relative values. The paper is an important contribution.—*W. G. S.*

Food of Birds. By L. Florence (*Trans. High. and Agric. Soc. Scotland*, xxiv., pp. 180–219; 1912).—Details of contents of crops and intestines of 616 birds of many species, mostly from North-East Scotland, with a summary for each species of the remains (seeds, insects, &c.) identified.—*W. G. S.*

Forcing by Hot Water. By Prof. Hans Molisch (*Rev. Hort. Belge*, No. 21, p. 333, Nov. 1, 1912).—Another testimony to the efficacy of the hot-bath treatment in forcing flowering plants. It is here said to give excellent results with the following flowering shrubs :—*Corylus Avellana, Syringa vulgaris, Forsythia suspensa, Cornus alba, Ribes Grossularia, Larix decidua, Rhamnus, Frangula, Aesculus, Hippocastanum, Fraxinus excelsior*, &c.

Success depends on the nature of the plant, the time of the year at which the operation is carried out, on the right duration of the bath, on its correct temperature, and on the more or less dormant state of the plant.—*M. L. H.*

Forest Conditions in Louisiana. By J. H. Foster (*U.S.A. Dep. Agr., For. Serv., Bull.* 114; Oct. 22, 1912).—Like many other parts of the American Continent, protection of cut-over lands is the most important forest problem in Louisiana.

Penalties are provided for setting of forest fires, and railway companies are required to keep their right-of-way cleared of combustible materials from November to April.—*A. D. W*

Forest Fires : their Causes, Extent and Effects, with a Summary of Recorded Destruction and Loss. By Fred G. Plummer (*U.S.A. Dep. Agr., For. Serv., Bull.* 117; Oct. 23, 1912).—An interesting account of the causes of forest fires, the vast extent of woods involved, and the statistics of damage and loss arising therefrom. Lightning is the principal cause of forest fires, although many originate from the well-known practice of firing the grass.—*A. D. W.*

Forest Tree Seed, Extracting and Cleaning. (*U.S.A. Dep. Agr., For. Serv., Circ.* 208; Oct. 16, 1912).—An outline of the methods of seed-storing, drying by natural and artificial heat, extracting, cleaning and keeping until required for use.—*A. D. W.*

Forestry Area, Experimental, in Wales. By Fraser Story (*Trans. Scott. Arbor. Soc.*, pp. 19–27; July 1913).—A useful summary of experimental plantations in Wales. Details are given of the various woods, their progress and enemies. In a summary there is a list of thirty-seven species, showing how many have been planted, with the percentage of deaths; this is high in the case of Corsican Pine, Pacific Arbor Vitae, Oak, and Lawson's Cypress.—*W. G. S.*

Forestry Work, Co-operative. By Edmund Secrest (*U.S.A. Exp. Stn., Ohio, Circ.* 119; Dec. 29, 1911).—An excellent idea. The

station gives practical assistance to the landowner or planter, and also to establish in suitable centres examples of forest planting and management.—*A. D. W.*

Forests of North-Eastern America. By William S. Cooper (*Bot. Gaz.*, Jan. 1913, pp. 1–44; Feb. 1913, pp. 115–140; March 1913, pp. 189–235, with 55 figures and map).—This paper, entitled "The Climax Forest of Isle Royale and Its Development," is of great importance to all who are interested in forestry and is a valuable contribution to ecological Botany.

The author begins with the geographical conditions of the district when it was first abandoned by the glaciers of the Ice Age, or, rather, was covered by the waters of a glacial lake, and traces every stage by which the present final forest established itself.

This climax forest consists of White Spruce (*Picea canadensis*), *Betula alba* var. *papyrifera*, and *Abies balsamea*, the last forming about 78·7 per cent. But of the larger trees (over 2·5 dm. in diameter) only 33·3 per cent. belong to this species. The balsam fir is extremely prolific and propagates itself not only by seed but by a process of natural layering, but it is very susceptible to fungus attacks and diseases, and the wood is brittle, so that the trees are often overthrown by wind. The birch has a low birth-rate, but is fairly wind-firm and not much affected by fungus attacks, and forms a good proportion of the mature stand. The white spruce seeds about once in eight years, and the seedlings require abundant light. The largest trees are of this species and they are able to withstand severe winds, often towering conspicuously above the general forest level. Amongst other trees found in the final or climax forest are *Pyrus americana*, *Pinus Strobus*, *Picea mariana*, *Larix laricina*, *Populus tremuloides*, and *P. balsamifera*. The author thinks it probable that the whole of the North-Eastern conifer-region is of this climax type, but the balsam fir does not extend so far to the north and north-west as the other two species, and is probably represented by others which may be considered ecologically equivalent. To the south of Lake Superior an entirely different hardwood forest, in which the beech and sugar-maple are most prominent, replaces the white spruce-paper birch type, and may be perhaps regarded as invading the conifer area just as the oak invaded the territory of Scotch pine in north-western Europe.

The original country as left at the close of the glacial period is classified as follows:—

1. Bare rock surfaces, which are occupied first by crustaceans, then by leafy and finally by fruticose lichens (*Cladonia* and *Stereocaulon*), with mosses such as *Rhacomitrium*. Upon this mat, scattered plants of *Cryptogramma*, *Diervilla*, and *Arctostaphylos* establish themselves.

2. Rock crevices are soon filled by surface wash and are quickly occupied by plants, of which 100 species have been noted by the author as crevice plants. Junipers, *Vaccinium*, *Arctostaphylos*, and *Thuja*

occidentalis are specially important. After these forerunners have had their day, the trees of the climax forest begin to appear.

3. Rock pools are usually occupied by *Scirpus caespitosus*; *Polytrichum* forming a turf mat on which *Vaccinium, Andromeda*, and *Alnus* establish themselves.

These three different successions are finally united in a (4) Heath mat chiefly by the agency of *Juniperus, Arctostaphylos*, and *Thuja occidentalis*. This may be forthwith annexed by the climax forest or there may be an intermediate type of dry-climate forest (5) in which *Pinus Banksiana, Picea mariana* (black spruce), and occasionally aspen are dominant forms.

On the Gull Islands was found a somewhat different succession, in which *Calamagrostis canadensis* and *Pyrus americana* were prominent species. A similar vegetation may have been the first to occupy the summit of the ridges of Isle Royale when they first emerged from the glacial waters of Lake Duluth.

Along beaches of sand or shingle the climax forest soon covers the ground, but is usually fringed by a line of *Alnus crispa*, and along the shingles by pioneer species such as *Equisetum arvense, Epilobium angustifolium, Deschampsia caespitosa, Rubus, Rosa*, and *Salix*. The lakes are occupied at first by aquatics, *Isoetes, Chara, Potamogeton*. There is also a water-lily zone and one of amphibious plants, such as *Menyanthes* and *Lysimachia thyrsiflora*, which are often mat-formers. These are followed by the bog forest, in which *Larix americana, Picea mariana*, and *Alnus incana* are the most important. In other places *Carex filiformis, Eleocharis palustris*, and *Equisetum fluviatile* form a sedge mat, the first named being the most important.

Sphagnum forms, in the lakes described, a superficial layer upon the sedge mat and does not contribute in any large degree to peat formation. It begins some distance within the margin of the bog and works outwards and towards the centre. It grows up round those shrubs, such as *Chamaedaphne* and *Andromeda*, which are established on the sedge mat, and on its surface are found Sundew, *Oxycoccos, Carex pauciflora*, and *Smilacina*. The *Sphagnum* is then colonized and suppressed by *Ledum groenlandicum*, and this last is invaded by the bog-forest of tamarack and black spruce, which are again superseded by the climax forest. The delta swamp succession is also described, the stages being *Potamogeton, Equisetum*, sedge mat and bog herbs, *Myrica Gale, Alnus* and other shrubs, swamp forest with *Fraxinus nigra* as pioneer, then the trees of the climax forest.

When the forest has been burnt down, but without destroying the humus, the first growing season shows a profusion of *Epilobium angustifolium* and *Anaphalis margaritacea*; seedling birches and poplars, with *Rubus Idaeus, Diervilla, Corylus*, &c., follows, and bracken, *Aster*, and others replace the *Epilobium*.

The bibliography seems almost entirely American, but even this short abstract will remind European readers of closely parallel successions in the Old World, and those who consult the original will find

that the author is unusually merciful in his employment of technical and abstruse terms, and can explain himself clearly.—*G. F. S. E.*

Fruit Trees, Manures for. By M. Nar. Espaullard (*Jour. Soc. Nat. Hort. Fr.*, 4th Series, vol. xiii., p. 470, July 1912).—Eight Pear trees of the variety 'Passe-Crassane' were treated in the following eight ways for three consecutive seasons :—

No. 1 was watered each time with 10 litres of water containing 10 grammes of nitrate of soda.

No. 2 with 10 grammes nitrate of soda, 10 grammes phosphate of soda, 10 grammes carbonate of potash.

No. 3 with 10 grammes phosphate of soda.

No. 4 with 10 grammes carbonate of potash.

No. 5 with 10 grammes phosphate of ammonia.

No. 6 with 10 grammes phosphate of potash.

No. 7 with pure water.

No. 8 was not treated at all.

The waterings were continued every eight days, from April 23 till September 17.

The fruit from each tree was gathered, labelled, and stored separately, and as a result of the three years' observations the writer of this note considers that phosphate and potash manures produce fine fruit and have no bad effects on the keeping qualities of the crop. On the other hand, nitrate of soda produces wrinkled, badly-keeping fruit, and is more calculated to produce abundant growth of foliage.

M. L. H.

Ginseng, the Diseases of, and their Control. By H. H. Whetzel and G. Rosenbaum (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 250 ; 1912).—This bulletin is published with the idea of aiding the practical grower to recognize the common diseases of ginseng, and to enable him to apply remedies to prevent severe losses and the spread of the disease. Bordeaux mixture is recommended as a spray, and the steam sterilization of soil for seed beds.—*D. M. C.*

Gladiolus Gandavensis 'Schwaben' (*Rev. Hort. Belge*, No. 24, p. 377, Dec. 15, 1912 plate.)—This hybrid, produced by Pfitzer of Stuttgart, is said to be a most attractive novelty. In colour it is canary-yellow, fading to sulphur-yellow, the throat being a deeper yellow with two crimson blotches. It is a strong grower and a free flowerer.—*M. L. H.*

Gloucestershire, A Wild Garden. By W. Lock Mellersh (*Gard. Chron.*, pp. 309–310 ; October 26, 1912 ; with 4 figs.).—Describes the garden in Pittville Park, Cheltenham, in which is grown a living collection of only those plants found wild in the county which are of note for variety or beauty.—*E. A. B.*

Grafts Rooted (*Journ. Soc. Nat. Hort. Fr.*, ser. iv., xiii., p. 313 ; June 1912).—M. Lucien Daniel has made a communication to the

"Académie des Sciences" from which it appears that the anatomical examination of grafts of *Helianthus* on *Helianthus* and of *Opuntia* on various Cacti has revealed to him the existence of internal adventitious roots formed in the stock and penetrating to varying depths in its tissues. Occasionally these roots even reach the soil and bestow complete independence on the graft. M. Daniel considers this to be the probable explanation of certain cases of hybridization through grafting.—*M. L. H.*

Grapes, Black Rot Disease of. By Donald Reddis (*U.S.A. Exp. Stn., Cornell, Bull.* 293; 1912).

Guignardia Bidwelli, Black Rot, so called to distinguish it from grey and brown rots due to mildews, &c., is one of the worst diseases the wine-grower has to contend with.

All green parts of the plant are attacked, showing reddish-brown, more or less circular spots. The spots on the young berries increase rapidly in size, a thin superficial crust appears, and the whole berry may become involved.

Pycnidial, spermagonial, and perithecial stages occur. The perithecia, containing many asci, form the resting stage, and can develop at very low temperatures as long as there is sufficient moisture present. The ascospores infect the young leaves and green portions of the plant.

The author has found through experience that every infection of any consequence is directly traceable to meteorological conditions, rain of some duration, or rain followed by fog. The spores of the fungus are discharged by a mechanical process, in the presence of precipitated moisture only. Moisture is also necessary for the germination of the spores. Bordeaux mixture has been found to give the best results. Spray before rain if possible.

Many good figures are given, together with an extensive bibliography.—*D. M. C.*

Heather, Biology of. By M. C. Rayner (*New Phytologist*, xii. 59–77; 1913; 1 plate, 2 text figs.).—While this paper is largely of ecological interest and refers to the investigation of the common heather (*Calluna vulgaris*), some of the interesting results obtained by the authoress may well prove to be of general application to Ericaceae and other plants with a mycorrhiza. While the heather is usually recorded as forming definite heath communities, in competition with other plants, only on poor and often acid soils, sporadic communities of this plant were found on the higher parts of the downs in Wiltshire and Berkshire, forming patches of typical heath vegetation. The soil monopolized by the heather was found to be in all respects a good fertile loam, with a high percentage of available mineral matter; apart from the low percentage of calcium carbonate, there was no evident factor to account for the successful competition of the *Calluna* on this somewhat unusual substratum. The object of the investigation was

to study the biological significance of calcium carbonate as a factor in the occurrence of *Calluna*, and to ascertain whether the facts obtained might throw light on the question of calcicole ("lime-loving") and calcifuge ("lime-hating") plants in general.

Pot cultures showed that *Calluna* grows normally in soil from a typical heather area ("heather soil"), abnormally in soil directly overlying chalk ("down soil"). In the latter case abnormality of growth was shown by reduced germination capacity, retarded germination, arrest of root and curvatures of the growing region, arrest of shoot, and small size and red coloration of the leaves; also with these abnormalities was associated the presence of colonies of bacteria on the roots, and marked diminution of vigour in the growth of the mycorrhizal fungus. The growth abnormalities can be induced in seedlings growing in heather soil by watering with extracts of the down soil; the unfavourable factors are evidently of a chemical nature. Culture experiments showed that the development of the fungal and bacterial elements associated with the seed-coat is determined qualitatively by the nature of the soil extract used; with extract of heather soil the mycelial constituent is predominant, with a down soil extract bacterial colonies form the prominent feature. Sterilized seedlings germinated and for a time grew normally, but in the absence of infection the root soon showed complete arrest of growth and the seedlings died. The relation between *Calluna* and its mycorrhizal fungus is apparently obligate, and successful growth of the plant is ultimately dependent on infection of the roots at an early stage by the fungus and the subsequent healthy growth of the latter; hence the soil preferences shown by the plant depend on the maintenance of a biological balance between the roots and the constituents of the micro-flora which beset them.—*F. C.*

Inheritance of Flower size. By E. M. East (*Bot. Gaz.*, pp. 177–188; March 1913; with 4 plates).—The author used for his experiments *Nicotiana Forgetiana*, Hort. Sand., and *N. alata grandiflora*. Both species are almost always naturally self-fertilized.

The first-named species has a mean corolla length of 25·6 mm. When crossed with the latter (mean corolla length 78·8 mm.), the first generation had a mean variability of 44·3 mm. This F1 generation had very small, but the F2 generation (by fertilization of F1 *inter se*) had great variability. The author considers that this result coincides with expectation, supposing no dominance and four cumulative but independent pairs of unit factors.

The author assumes that the effect of environment on the size of the corolla is so small as to be negligible.

There is nearly perfect correlation of corolla length with style and filament lengths, and a 61 per cent. average correlation of length with breadth. The range of fluctuation in length is twice as great in the larger-flowered species.—*G. F. S. E.*

Iris 'Snow Queen.' By W. R. Dykes (*Garden*, p. 562, Nov. 9, 1912).—The author puts forward the view that this fine Iris is merely the albino form of Thunberg's *I. orientalis*, which is probably a species distinct from *I. sibirica*. Possibly the two plants merely represent different combinations of Mendelian characters. *I. sibirica* has long stems raising the flowers well above the foliage, producing heads of 3, 4, and 5 flowers on pedicels of increasing length; the capsules are short, broad, and bulging, and contain flat seeds. *I. orientalis* has leaves as long as or longer than the stems, of which the terminal head rarely contains more than two flowers on comparatively short pedicels. The capsules are long and narrow, triangular in section, and contain small, thick, almost cubical seeds. The flowers of *I. sibirica* are smaller than those of *I. orientalis*, and the almost orbicular fall blades of the latter are extended nearly horizontally, while those of *I. sibirica* hang perpendicularly. 'Snow Queen' breeds true to the white colour, and is recessive for the colour factor; if cross-fertilized with the type, some beautiful forms of a bright sky-blue colour can be obtained of a shade the author has not seen elsewhere among Irises.—*H. R. D.*

Irrigation Studies. By C. I. Lewis, E. J. Kraus, and R. W. Rees (*U.S.A. Exp. Stn., Oregon, Bull.* 113, May 1912; 11 figs.).—Though the average annual rainfall in the Rogue River Valley is 28·8 inches, the fall from June to September, inclusive, is only 2·6 inches, and irrigation is therefore resorted to (p. 4). It has been found that in general the percentage of first-class fruit is increased by irrigation, this being particularly noticeable with a block of fifty-three mature and vigorous trees of 'Winter Nélis' pear, about one-third of the crop being under size where irrigated, and as much as three-quarters on the dry check plot, none of the fruit in the latter case being classed as above third size (p. 42). Some varieties of apples become more angular and elongated, the colour at the same time being brighter, though less deep, while both fruit and leaves hung on the trees longer in the autumn and a greater growth of wood was produced (p. 44). Water was applied in varying amounts according to the character of the soils, some pumice soils receiving as much as 3,500 gallons a tree in three applications, and medium and slightly heavy soils 1,000 to 2,000 gallons in two applications, while some of the heavier types have shown the best results under cultivation without the use of water (p. 45).—*A. P.*

Jordan, Theories of, Applied to Horticulture. By S. Blaringhem (*Rev. Hort. d'Alg.*, No. 12, p. 389, Dec. 1912).—An account of the Institution at Svalöf, in Sweden, where the theories and principles of Segregation, Selection, and Mutation are scientifically applied to the breeding of new races of different grains. A description is given of the work carried out there, with tables showing the system according to which the records are kept, and mention is made of the new and improved strains with which the establishment has in consequence

been able to supply the agriculturists of Europe. The writer presses for an international agreement, which will make some sort of certificate of indemnity from disease necessary before any seed grain may be exported from one country to another.—*M. L. H.*

Juniper, Preliminary Notes on Three Rots of. By G. G. Hedgcock and W. H. Long (*Mycologia*, iv. pp. 109–114; May 1912; plates).—The characteristics and effects of three rots of Junipers are given, the fungi causing them being described and micro-chemical studies detailed. The rots are: 'White rot,' due to *Fomes juniperinus*, attacking *Juniperus virginiana*; 'Yellow rot,' due to *Fomes Earlei*, attacking *J. monosperma*, *J. utahensis* and *J. sabinoides*; and 'Stringy brown rot,' due to *Fomes texanus*, attacking the same three species.—*F. J. C.*

Juniper, Utah, in Central Arizona. By Frank J. Phillips and Walter Mulford (*U.S.A. Dep. Agr., For. Serv., Circ.* 197; June 8, 1912).—Although of ornamental aspect, the Utah Juniper is valued mainly for the production of cordwood and fencing posts. The average yield in well-managed woods of this Juniper is about 662 cubic feet, or, roughly speaking, 10 cords of firewood an acre. The growth of this Juniper is exceedingly crooked, and it usually forks at a little above ground level.—*A. D. W.*

Laburnums. By D. (*Garden*, p. 229, May 11, 1912).—The two commoner kinds occupy, with the double-flowering Thorns, the most important position among the smaller flowering trees, for there are few places where they will not grow and flower well. The wood is ornamental and takes a high polish, and is sometimes used for turning or inlaying.

L. alpinum, the Scotch Laburnum, grows 20 to 25 feet; it flowers towards the end of May, two or three weeks later than *L. vulgare*. Varieties are: *autumnalis*, which often produces a second crop of flowers in autumn; *biferum*, with divided leaflets; *fragrans*, with sweet-scented blossoms; *hirsutum* and *pilosum*, with hairy leaves.

L. vulgare, the common Laburnum, usually 15 to 18 feet, often 25 feet or more. It flowers in early May. The more showy varieties are *Alschingeri*, *Carlieri*, *Jacquinianum*, and *Linneanum*. *Foliis aureis* has yellowish leaves; *involutum*, *monstrosum*, *cristatum*, and *quercifolium* have more or less deformed or abnormal foliage; *sessilifolium* is interesting, its leaves often being sessile, a peculiarity which is not constant.

L. caramanicum, a curious shrubby plant from Asia Minor, is rather like a Cytisus and flowers at the end of August or in early September.

L. Adami originated 80 years ago as a graft hybrid between *L. vulgare* and *Cytisus purpureus*, the former having been used as the stock.

L. Parkeri, a hybrid between *L. alpinum* and *L. vulgare*; its inflorescences are sometimes a foot long.

L. Watereri, of the same parentage, is a glorified Scotch Laburnum.

H. R. D.

Leaves, Migration in, in Autumn (*Jour. Soc. Nat. Hort. Fr.*, 4th Series, vol. xiii., p. 693, Nov., 1912).—Before falling, leaves turn yellow. This arrest of activity corresponds to a migration of elements in the plant, which phenomenon has been measured by a German agriculturist in the leaves of fruit trees. He shows that the migration begins on July 14 and ceases on Nov. 1. The diminution of the dry remainder of the leaf is from 30 to 35 per cent. There is therefore an active phenomenon, and not a simple desiccation. The potash, lime, magnesium, and phosphoric acid, but not the silica, are thus returned to the tissues of the tree. The nitrate goes back to it rapidly, as well as the carbohydrates and organic acids. The leaf merely preserves its cellular elements. When the cold comes too early the leaves fall without this preliminary migration. These researches show what mistakes may be made by agriculturists who supply additional fertilizing elements after a calculation of the elements of the leaves in a green state. It is necessary to wait for the fallen leaves to appreciate the amount they are calculated to return to the soil.—*M. L. H.*

Leguminous Plants, Life-history of Ascochyta on some. By R. E. Stone (*Annal. Mycol.*, x., pp. 564–592; June, 1912; 2 plates).—The author deals first with the fungus *Ascochyta pisi*, a troublesome pest of culinary peas, showing that it is connected with the higher form known as *Sphaerella pinodes* (Berk. and Blox.) Niessl. The *Ascochyta* which grows on nutrient media from the spores of the *Sphaerella* readily infects peas producing the characteristic spots. In the same way he shows that *A. viciae* and *S. viciae* are connected. The two forms *S. pinodes* and *S. viciae* are shown to be identical, and probably so also is that which occurs on the Everlasting Pea and on the Sweet Pea. The new combination *Mycosphaerella pinodes* is proposed for this species. *Ascochyta lethalis* on melilot is found to be connected with a new ascochycetous fungus which the author calls *Mycosphaerella lethalis*, Stone.—*F. J. C.*

Leptospermum Scoparium Nichollii. By L. Roberts (*Gard. Chron.*, p. 270; October 5, 1912).—Gives the history of the origin of this red form.—*E. A. B.*

Lightning in Relation to Forest Fires. By Fred G. Plummer (*U.S.A. Dep. Agr., For. Serv., Bull.* 111; Sept. 12, 1912).—A most interesting and instructive report of lightning in relation to forest trees, which may be summed up as follows:—The likelihood of a tree being struck by lightning is increased (*a*) if it is taller than the surrounding trees, (*b*) if isolated, (*c*) if on high ground, (*d*) if deeply rooted, (*e*) if it is the best conductor.—*A. D. W.*

Lime Sulphur as a Summer Spray. By C. Errett Wallace. (*U.S.A. Exp. Stn., Cornell; University of Nebraska Press, Bull.* 37)—

These authorities recommend four applications of lime sulphur against scab :

1st, just as colour shows itself in blossom buds.
2nd, just as soon as blossoms fall.
3rd, two weeks later.
4th, nine weeks later for apples.

The addition of lead arseniate adds to the effectiveness of the spray against scab ; thus while the controls gave 100 per cent. infected trees, lime sulphur alone 73 per cent., the addition of lead arseniate reduced the infection to 11·7 per cent. Pear scab requires constant washing first year, to be effective. Spraying reduced pear scab from 85 per cent. to 4·5 per cent., also increased the quantity of good fruit by sixteen times.—*G. P. C.*

Lime Sulphur, Lead Benzoate, and Bordeaux Mixture for Spraying Potatoes, A Comparative Test of. By F. C. Stewart and G. T. French (*U.S.A. Exp. Stn., New York, Bull.* 347).—Lime sulphur 1 in 40, dry lead benzoate 1 lb. in 50 gallons, Bordeaux mixture, 6–6–50, were proportions used in above experiments. Six applications in all, the results being that lead benzoate only equal to control plots, lime sulphur not so good as control plots, Bordeaux strikingly superior.

In the resulting crops, Bordeaux gave an increase of 100·3 bushels, lead benzoate a decrease of 6 bushels, lime sulphur a decrease of 39·5 bushels an acre as compared with unsprayed controls.

Lime sulphur not only decreased the yield but considerably dwarfs the plant.—*G. P. C.*

Lime Sulphur, Spray Injury by. By Errett Wallace (*U.S.A. Exp. Stn., Cornell, Bull.* 288 ; December 1910).—Spray injury mostly caused by over-spraying, the fluid running down and forming heavy drops on tips of leaves. As the water evaporates, the lime sulphur becomes concentrated and burning ensues ; the damage being caused by soluble calcium sulphide.

All types of arsenical washes cause greater injury than lead arseniate in combination with lime sulphur.

Lime sulphur causes less russeting than Bordeaux, the ratio being as low as 1·6 per cent. for the former to 58·2 per cent. for the latter.

G. P. C.

Lime Sulphur, The Preparation and Use of Concentrated (*U.S.A. Exp. Stn., Pennsylvania, Bull.* 115).—The above bulletin deals with the manufacturers' side of lime-sulphur washes.

It is divided into three sections, as follows :—

(1) The description of materials and apparatus necessary for manufacturing lime sulphur on a large scale.

(2) The tables of density of sprays and times of application of same, for scale and scab.

(3) The table of dilutions for various times and purposes, with some recipes for the addition of ortho-arsenates, $Pb_3(AsO_4)_2$, lead acetates, and lead arsenates for the prevention of burning by summer spraying.—*G. P. C.*

Liming plus Chemicals on Grass Lands, the Value of (*U.S.A. Exp. Stn., Rhode I., Bull.* 148).—The use of 3 tons ground limestone plus chemicals increased the yield tremendously, especially where the sod was poor and the land re-seeded. Some further experiments were carried on on beets, melons, and oats.

The addition of ground limestone gave increase in all cases, especially with melons, where the yield was twice as great.—*G. P. C.*

Ling and its Varieties. By D. (*Garden*, p. 528, Oct. 19, 1913).—Ling (*Calluna vulgaris*) is nearly related to the Heaths, but differs in leaf arrangement. In *Erica* the leaves are loosely in whorls, in *Calluna* they are closely parallel and disposed so as to give a four-angled appearance.

There is only one species of *Calluna*, but it is prolific in varieties. On the same hill the flowers may be found to vary from the common light red to white or dark red. White is the most popular, and there is now a considerable trade in white Heather.

A good selection is the following:

Strong-growing, white: *alba, alba rigida, alba Serei* and *Hammondii.*

Dwarf, white: *alba minor, alba pumila.*

Strong-growing, red: *Alportii, rubra, flore pleno.*

Golden and copper leaves: *aurea, cuprea.*

Dwarf, but not free flowering: *Foxii hypnoides, minima, pygmaea.*

H. R. D.

Lophodermium nervisequum (DC.) Fr. By P. Spaulding (*Mycologia*, iv. pp. 149–150; May 1912).—The leaves of *Abies balsamea* are caused to turn yellow soon after infection, which occurs in June, and by the beginning of winter they become brown. In spring the epidermis splits along the entire length of the leaf and exposes the fruits of the fungus. The disease is most prevalent on the lower parts of the trees and on young trees which have been heavily shaded by older ones. It has not yet appeared in nurseries, where this tree is not often grown.—*F. J. C.*

Magnesia for Roses (*Gard. Chron.*, p. 481; December 28, 1912).—A concise account of experiments, the result being summed up thus by M. Cochet:—

1. Magnesia exercises a definite influence on the growth of Roses.

2. Employed in the form of carbonate to Grifferais stock, it augments development and prolongs growth into autumn, enabling the plant to retain its leaves.—*E. A. B.*

Migration of Mineral Substances from Dying Leaves. By E. Ramann (*Landwirtsch. Versuchsstat.* lxxvi. 157–168; 1912).—The author continues, in two papers on this subject, the interesting series of studies on the metabolism of deciduous trees which he has carried on for several years, both independently and in conjunction with H. Bauer. The first paper deals with the migration of mineral substances from leaves during the normal process of autumnal fall, the second with the migration occurring in leaves killed by frost. During spring and summer large quantities of mineral matter accumulate in the leaves, owing to the transpiration process, while in autumn there is a migration of mineral matter from the leaves to other parts of the plant prior to the cutting-off of the leaf by the absciss layer. Ash analyses show that in the comparatively short interval that elapses between the assumption of the autumn colouring, owing to changes in the chlorophyll of the dying cells, and the actual death of the leaf, there is a rapid passage of nitrogenous compounds, potassium salts, and phosphates from leaf to stem. But, on the other hand, calcium salts and silica increase in amount in the dying leaf, and the amount of these substances may be twice as great as in normal green leaves. The results of Ramann's analyses of the leaves of various trees are of considerable horticultural and ecological interest; for instance, the well-known fact that beech and oak make rich humus is evidently connected with the fact tnat their leaves retain an unusually large proportion of their nitrogenous and phosphorus-containing compounds.

In the second paper, Ramann gives the results of analyses of pear leaves, some of which were killed by frost, while others remained uninjured. The former showed diminution in potassium and phosphorus, but increase in calcium content, exactly as in normal autumn withering, though the migration of substances from the leaf was less marked. Migration of substances into and out of the leaf took place during the short period between the thawing and the perishing of the frozen leaves; but since death of the tissues in non-resistant leaves like those of pear takes place during the actual freezing, and not after thawing, the exit of the potash and phosphoric acid would be simply a post-mortem change due to osmotic diffusion, and could not therefore be effected in a period too short to allow of the conversion and transport of organic nitrogenous substances.—*F. C.*

Milkweed. By Arthur C. Neish, Ph.D. (*Jour. Soc. Chem. Ind.*, vol. xxii. No. 2, pp. 72–73).—An investigation to ascertain whether the various milkweeds of America, which abound in such quantity, could not be made use of. *Asclepias incarnata* and others were taken in hand. Two to three per cent. of rubber had been previously shown by another author to be present in the latex, but both quantity and quality are such as to render this of little commercial interest. The stalk yielded fibre up to 6 feet in length closely resembling flax, but stronger, white, and of silky appearance, which should be of value for textile or rope manufacture. The dried seeds yielded over 20 per

cent. of oil, and a residue of possible value for cattle food, which is still under investigation. A soft down attached to the seeds to the extent of about 6 grams to a plant may be of value as a substitute for feathers in cushions, &c., for upholstery work. From the woody tissue a pulp was obtained which made a paper of good quality.—*W. A. V.*

Narcissus : Climatic Influences on Hybridisation in 1912. By C. E. Shea (*Garden*, p. 463, Sept. 14, 1912).—March, April, and part of May was a period of abnormally low temperature and frequent frost; coupled with this was an abnormal earliness in flowering. The author found that the injury resulting from the abnormal conditions sustained in the trumpet section was trivial when compared with that sustained by the Medio and Parvi sections. He gives details of the experiments on which the conclusions are based.

Ib., p. 465, somewhat similar results were obtained by J. W. Jones, though he attributes them to the pollen.—*H. R. D.*

Narcissus poeticus. By Rev. J. Jacob (*Garden*, p. 341, July 6, 1912).—Notes on the numerous forms of *N. poeticus* grouped under those with (1) an all-red eye; (2) suffused red eye; (3) rimmed eye.

H. R. D.

Nectar Organisms. By I. V. Schuster and V. Ulehla (*Ber. d. deutsch. bot. Ges.* xxxi. 129–139; 1913; 1 plate).—The authors have investigated the micro-organisms found in the nectaries of various flowers, as well as in such positions as the cavity of the stigma in the pansy. From their observations and cultures they conclude that these organisms (yeasts and bacteria) are specially differentiated forms, belonging to distinct species which have become adapted for life in the nectar of flowers. They find that the almost ubiquitous moulds (*Mucor*, *Penicillium*, *Aspergillus*, &c.) very rarely occur in nectar, and that the presence of the special yeasts and bacteria is so general as to suggest that we have here an interesting case of symbiosis, or at any rate that these micro-organisms are not in the least degree injurious to the flowers. It appears probable that the organisms in question, or their spores, are carried from flower to flower by visiting insects, and that the infection of the nectar by these special organisms is not merely accidental and casual. Several species of both yeasts and bacteria were distinguished, the bacteria being in some cases motile and in others non-motile; in most cases the same species was found in nearly all the flowers examined, and none of them appear to agree in specific characters with yeasts and bacteria occurring elsewhere than in the nectar of flowers.—*F. C.*

New Plants from Idaho. By Aven Nelson (*Bot. Gaz.*, pp. 404–418; Mar. 1912).—Describes new species of *Melica*, *Calochortus*, *Zygadenus*, *Salix*, *Eriogonum*, *Stellaria*, *Crataegus*, *Trifolium*, *Lupinus*, *Astragalus* (2 sp.), *Lathyrus*, *Viola*, *Cordylanthus*, *Pentstemon*, *Artemisia*.—*G. F. S. E.*

Niagara Electric. By M. A. Laforest (*Jour. Soc. Nat. Hort. Fr.*; 4th Series, vol. xiii., p. 572, Sept. 1912).—The apparatus called by this name, installed at intervals around a certain area, was supposed to be going completely to protect that area from hail. Later experiences, however, have proved that it is quite ineffective for this purpose.

M. L. H.

Nicotiana Tabacum, Correlation and Inheritance in. By H. K. Hayes (*U.S.A. Exp. Stn. Conn., Bull.* 171, 45 pp.; 5 pl.).—The results of experiments made upon different Tobaccos with a view of studying the inheritance of quantitative characters and of correlation. The very difficult point of separating variations caused by culture and those which are truly inherited is discussed, but no very definite conclusion is arrived at. The correlation co-efficients between number of leaves and the height of a plant, number of leaves and leaf area, &c., are given for a large number of crosses, but are obviously impossible to quote here without the context.—*E. A. Bd.*

Nitrification in Different Soils. By H. Fischer (*Landwirtsch. Jahrb.* xli. 755; 1912).—The author found that nitrification takes place more rapidly in a somewhat heavy soil than in a light sand. One of the causes is evidently the lack of lime in the latter soil. On the other hand, the formation of ammonia is greater in light than in heavy soils. The theoretical quantity of lime calculated as being necessary for the nitrification of a given quantity of ammonia does not in reality suffice for complete nitrification, this process attaining its maximum rapidity with about three times the theoretical amount of lime. Nitrification is favoured by the supply of organic materials such as sugar or peat-decoction, but when too much organic material is supplied denitrification takes place, especially in light soils. The author's experiments on the bacterial content of three originally similar soils treated differently for three years (unmanured, ammonium sulphate added, sodium nitrate added) lead him to the conclusion that the bacterial differences between such differently treated soils are relatively slight, and that a much more natural expression of the bacterial character of a soil is given by actual soil experiments than by water-cultures.—*F. C.*

Nitrogen in Five Years' Experiment with Legumes, The Gain in (*U.S.A. Exp. Stn., Rhode I., Bull.* 147, 1911).—Crops grown, Crimson Clover, Cowpea, Soybean, and Vetch.

The increase amounted to 1 ton of nitrogen to the acre, seven-tenths being removed by the crops, the remainder left in soil.

The value of legume crops to farmers is calculated at £13 per annum from each acre.—*C. P. C.*

Onion Couch. By L. M. Underwood (*Jour. Agr. Sci.* iv. pp. 270–272; Jan. 1912; figs.).—Seeds of the onion couch (*Arrhenatherum bulbosum*) and of the common form of the tall oat grass (*Arrhenatherum*

avenaceum) were sown side by side on a variety of different soils to ascertain whether the bulbous form was a response to external conditions. In all cases both the bulbous form and the normal form were reproduced true. The habit of forming bulbs is therefore hereditary, and independent of conditions of habitat.—*F. J. C.*

Orchard Heating. By W. A. Irvin (*U.S.A. St. Bd. Hort., Missouri, 4th Ann. Rep.*, 1910, pp. 159–164).—An interesting and suggestive record of the practical experience of a grower. Three thousand smudge pots, each holding 1½ gallons of oil, were used for protecting 6,000 trees, and it took eight men less than an hour to light them. The grower estimated the cost at $300 for the season (? once firing only), and the results were so satisfactory that he is putting a heater to each tree and another thousand on the outside of the orchard. The temperature of the orchard can be raised 6° in four hours in this way.—*A. P.*

Orchard Management. By C. I. Lewis (*U.S.A. Exp. Stn., Oregon, Bull.* 111, Sept. 1911; 41 figs.).—This State contains the famous Hood River Valley, where there are about 10,000 acres of orchards, Yellow Newton and Spitzenberg being the principal varieties. Lists are given of the varieties of fruits best adapted to different districts. Walnuts are largely grown, and the writer believes that seedling trees will have to be discarded to a large extent in favour of grafted trees, the former varying both as to type of nut and bearing habit (p. 72). The delicate practice of walnut grafting is described at length (pp. 91 and 92).—*A. P.*

Orchid Embryosac. By Lester W. Sharp (*Bot. Gaz.*, pp. 372–385; Nov. 1912; with 3 plates).—The author describes in detail the minute embryology of the embryosac in some 9 species of orchid. There is much variability in development within the species, resulting in a reduction in the number of divisions between the megaspore and the egg. There is a tendency to mature the egg earlier in these orchids. The embryosac shows, however, remarkable uniformity. The endosperm nucleus disorganizes without dividing.—*G. F. S. E.*

Ornamental Shrubs, When to Prune. By W. D. (*Garden*, p. 70, Feb. 10, 1912, and p. 81, Feb. 17, 1912).—An excellent article, giving details of time and manner of pruning ornamental shrubs.—*H. R. D.*

Pachira macrocarpa. By H. Memmler (*Die Gart.* p. 106; Feb. 22, 1913; well illustrated).—Nat. Ord. *Malvaceae*, a native of tropical Mexico. It has large flowers with white silky petals, very fragrant. Leaves digitate with 7–11 leaflets. It forms a small tree.—*G. R.*

Packing Apples and Peaches. By Alderman (*U.S.A. Exp. Stn., West Virginia, Bull.* 139, 12 pp.; 38 figs.).—Full instructions for packing fruits for market purposes, containing no new suggestions.
E. A. Bd.

Peach Leaf-Curl. By Errett Wallace and H. H. Whetzel (*U.S.A. Exp. Stn., Cornell, Bull.* 276; April 1910).—Peach leaf-curl (*Exoascus deformans*) can be controlled by spraying about one month before the buds begin to swell in spring.

If by any chance the spraying has been delayed until the buds have begun to swell, care should be taken to spray, if possible, before long periods of cold rain.

Bordeaux mixture 5-5-50 to 3-4-50, and self-boiled lime sulphur wash have proved very effective, if the spray is applied to the trees when they are dormant.—*D. M. C.*

Pear, New. By Arnold Furst (*Rev. Hort. Belge*, No. 3, p. 47, Feb. 1, 1912; plate).—A new pear—'Calabasse Mme. Charles Furst'—a cross between 'Calabasse Carafon' and 'Doyenné du Comice'—is said to be a valuable variety, bearing fruit remarkable both for quality and quantity.—*M. L. H.*

Pears, Apples, Quinces, &c., Fire Blight of. By H. H. Whetzel and V. B. Stuart (*U.S.A. Exp. Stn., Cornell, Dep. Pl. Path., Bull.* 272).—A bacterial disease due to *Bacillus amylovorus*, which has been known in America since 1881, but so far has not been recorded in Europe. In America it is one of the most serious diseases that pip fruit growers have to contend with. The disease attacks the blossom, which shrivels and falls, also the fruit, leaves, and stems, causing cankers in the last-named part of the tree in which the bacillus hibernates. The bacteria are carried from tree to tree and introduced into blossoms and growing shoots by insects of various kinds. M. B. Waite has proved that flies and wasps carry the bacteria from oozing cankers to opening blossoms and from these to others. The leaves turn black and hang on the trees through the winter.

It has been definitely shown that no sprays are effective in protecting the trees from the disease. It can only be controlled by destroying all sources of infection by (1) cutting out all cankers down to healthy tissues and removing diseased bark.

(2) Disinfecting all cuts with corrosive sublimate $\frac{1}{1000}$.

(3) Making regular inspections at least once a week, as soon as the blossoms begin to fall, and breaking out all diseased blossom spurs.

(4) Cutting out all blighted twigs, shoots, and water sprouts, &c. All diseased portions should be carefully burnt.—*D. M. C.*

Peat-Water, Poisonous Effect of. By George B. Rigg (*Bot. Gaz.*, pp. 314–326; April 1913).—The author used various solutions of bog-water from Puget Sound and neighbourhood to test the supposed poisonous effect.

He found that *Ledum groenlandicum*, *Kalmia glauca*, and also on other authority that *Oxycoccus* and *Vaccinium corymbosum* have no root hairs. *Larix laricina* has also roots "composed of mycorhiza."

Growing cuttings of *Tradescantia* in bog-water, he found that

18 per cent. formed no root hairs, whilst in 66 per cent. the hairs were much, and in 16 per cent. slightly, stunted.

Similar injurious effects were produced by diluted sea-water, ·001 per cent. carbolic, and by tea and coffee and other substances. The toxin is present in bog-water in very small amount, as when half dilution was used all the root hairs were normal. Bacteria were always found in bog-water and peat even from 75 cm. depth. Decay in fresh beef is almost as rapid in peat-water as in tap-water.

He concludes that there seems to be a toxin in bog-water which disappears with drainage (and after filtering water with filter paper), and that possibly the poisonous effect is due to the reduction of absorptive surface by injury of root hairs.—*G. F. S. E.*

Phosphate in Soils, Factors influencing Availability of Rock (*U.S.A. Exp. Stn., Wisconsin, Bull.* 20; January 1912).—The experiments carried out demonstrate that organic manures add to the availability of insoluble phosphates; the chief active agent being the carbon dioxide given off by organic manures and the roots of plants. When the ground phosphate is thoroughly incorporated with the soil, the weight of crop gathered is almost equal to that gained by the addition of acid phosphate.

Recommends all insoluble phosphates should first be thoroughly mixed in a good proportion of soil and then spread.—*G. P. C.*

Phosphates, Effect of Cowdung on the Availability of Ground Rock (*U.S.A. Exp. Stn., R.I., Bull.* 151; 1912).—A series of experiments to demonstrate whether the addition of rock phosphate to the dung would increase the availability of the former. In the end, the results showed nothing worth the extra cost and labour, a mere mixture used immediately giving rather better results than when mixed and allowed to stand over a long period.—*G. P. C.*

Phytophthora infestans and the Development of Oospores, On Pure Cultures of. By G. H. Pethybridge and P. A. Murphy (*Sci. Proc. Roy. Dublin Soc.*, vol. xiii., No. 36, pp. 566–588; March 1913; 2 plates).—Recent work has shown that it is possible to grow *Phytophthora infestans* (the Potato Blight fungus) as a saprophyte, and the authors, after summarizing previous work on the subject, give a full account of the media and method of culture they found to be successful.

Conidia are very easily procured in artificial cultures, but sexual organs, producing oospores (resting spores), could only be induced to form on two media—namely, Oat-juice Agar and Quaker Oat Agar. On the latter oospores developed plentifully, and the writers were thus able to confirm Clinton's results on the production of these bodies.

The development of the oogonium follows the remarkable course described by Pethybridge for *P. erythroseptica*. On Oat-juice agar, however, the oospores develop parthenogenetically, antheridia being

entirely absent. Whether *P. infestans* forms oospores normally in diseased Potato stems is an important question which awaits further research; but now that the oospores have been definitely examined and studied, it is possible to speak more certainly as to the identity of those resting spores that several writers have found in dead Potato haulm.—*A. D. C.*

Pinks, Double, To Recognize. By J. Lavalle (*Rev. Hort. de l'Alg.*, No. 10, p. 336, Oct. 1912).—It is asserted by a practical gardener, M. Jacoulet, of Lux, that it is possible to distinguish double from single-flowered seedlings of Pinks at a very early stage of their growth. All double-flowering seedlings have three cotyledons; single-flowering ones have only two. This is said to be proved by four years' observations.—*M. L. H.*

Plant Food in Relation to Feeding. By Cyril G. Hopkins (*U.S.A. Exp. Stn., Illinois*, 1912).—A paper showing that better results can be obtained by the use of suitable fertilizers in rotation than can be obtained by crop rotations alone without fertilizers.—*G. P. C.*

Plasmopara viticola, Spore Germination and Infection with. By C. I. Gregory (*Phytopathology*, ii. pp. 235–249; Dec. 1912; figs.).—An account of the mode of germination of the oospores of *Plasmopara viticola* is given with figures. In all cases observed a germ tube was produced which bore at its apex a single conidium. The germination of this conidium has not been followed, but the author believes it to follow the lines of the ordinary conidia and to set free from 1 to 17 swarm spores, but usually from five to eight. After swimming about for some time they become quiescent, and later germinate by sending out germ tubes which infects the vine leaf through the stomal openings.

F. J. C.

Pneumathodes in Begonia. By V. Vouk (*Ber. d. deutsch. bot. Ges.* xxx. 257–262; 1912; 1 plate).—On the stems of various marsh plants, and on the roots of some epiphytic orchids, curious structures termed pneumathodes have been described by various writers. These organs are special aerating tissue masses having the same functions as stomata and lenticels, and serving to replace or to supplement these more usual types of organ for the passage of gases into and out of the plant. Vouk now describes a peculiar type of pneumathode found in several species of *Begonia*, but especially well developed on the stem of shrubby species like *B. vitifolia*, *B. aptera*, *B. undulata*, and some others which have perennial aerial stems. At first sight these organs resemble lenticels, but they are green, and there is no cork-cambium layer underlying them as in the case of lenticels, which in these species are apparently replaced by this special type of aerating organ. Each pneumathode is covered by a small-celled epidermis, the cells having very thin walls and no distinct cuticle, hence allowing the ready passage of gases; below the epidermis the green tissue

consists of rounded cells with relatively small intercellular air-spaces ; and there are usually stomata in the epidermis, having the aperture closed up or nearly so. Comparatively little is known concerning the physiology, or even the structure and development, of the aerating system in plants, and Vouk's interesting contribution may be the means of calling attention to this line of investigation ; a fuller knowledge of the relation of the aerating system to the environment is especially desirable.—*F. C.*

Podocarpus formosensis. By R. Dümmer (*Gard. Chron.*, p. 295 ; October 19, 1912 ; with fig.).—Publication of this new species.
E. A. B.

Pollination Question, The (*U.S.A. Exp. Stn., Oregon, Circ. Bull.* 20, May 1912).—Some of the practical results of several years' work in this connexion are set forth. The conclusion is arrived at that in general cross-pollination does not affect the flavour, quality, or colour of the fruit, but merely its size, the percentage of set, and the uniformity of the crop. Sporadic instances of apparent effect are attributed rather to bud variation.—*A. P.*

Potato Sprouts, Ingrowing. By C. Stuart Gager (*Bot. Gaz.*, pp. 513–524 ; Dec. 1912 ; with 6 figs. and 1 plate).—The author figures and describes certain curious ingrowing shoots of the Potato produced in an unheated chamber which was neither dark nor damp. They do not digest their way through the tuber, but pass through by mechanical pressure. They do not penetrate through the uninjured skin from the outside, but easily penetrate it from the inside. The branches often form small tubers.—*G. F. S. E.*

Potato Tubers. On the Rotting of Potato Tubers by a new Species of Phytophthora. By G. H. Pethybridge (*Sci. Proc. Roy. Dublin Soc.*, vol. xiii., No. 35, pp. 529–565 ; March 1913 ; 3 plates).—The new disease of Potato tubers is caused by a fungus which under natural conditions appears to remain sterile. The author isolated the fungus with great care and found that it grew readily as a saprophyte in artificial culture, and that on certain substrata (especially on media derived from Oats) it produced reproductive bodies freely. The parasite proved to be a new species of *Phytophthora*, and is named *P. erythroseptica*.

The external symptoms of the disease are well marked. The tubers, often before lifting, become soft and watery, and when cut open and exposed to the air turn pink : hence the name ' Pink Rot.' Later the pink colour gives place to a purple-black. The isolation of the fungus and method of culture are described in detail, as is also the process of spore development. The development of the oogonium is so unlike anything previously known in the genus that the writer examined a number of allied forms, with the result that he found other

species to behave in the same way. He therefore divides the genus into two, and suggests some alteration in classification.

The disease has at present been found only in Ireland, but it is quite possible that it exists in England. It is worse where Potatos are grown on the same land for several years in succession; with a proper rotation it does not appear to give trouble. Proposals are made for the founding of a new genus to include *Phytophthora cactorum* and others of a similar type under the name *Nozenia*, and to establish a new family, the Phytophthoraceae, to include *P. infestans*, *P. phaseoli*, and *P. erythroseptica*. The disease is common in West Ireland and is probably transmitted by resting spores adherent to the skin of the tubers.—*F. J. C.*

Propagation, Plant. By W. L. Haward (*U.S.A. St. Bd. Hort., Missouri, 4th Ann. Rep.* 1910, pp. 177–216; 39 figs.).—The raising of young apple trees by piece root grafting is very fully described (pp. 178–184).—*A. P.*

Radish, Japanese (*Raphanus sativus* var. *acanthiformis*). By R. de Noter (*Rev. Hort. de l'Alg.*, No. 9, p. 304, Sept. 1912).—A plea for the more general cultivation of the Daïkon or Japanese Radish, which is said to be easy of cultivation, to flourish in any good soil, and to give the most wonderful returns. It forms part of the national food of the Japanese, and may be cooked and enjoyed by Europeans in a number of ways.—*M. L. H.*

Raffia, To make more lasting (*Rev. Hort. Belge*, No. 18, p. 295, Sept. 15, 1912).—The strength and durability of raffia will be very much increased if it is exposed before using to the fumes produced by burning sulphur in a closed receptacle.—*M. L. H.*

Results of the artificial Use of the White-fungus Disease in Kansas. By T. H. Billings and P. A. Glenn (*U.S. Dep. Agr., Bur. Ent., Bull.* 107; 1912).—Considerable damage is caused yearly to maize crops by the attacks of the Chinch bug, and experiments were carried out by the authors to ascertain whether artificial infections of the soil with the white-fungus (*Sporotrichum globuliferum*), a known fungus parasite of the Chinch bug, would prove an effective remedy. The results were negative. The fungus occurs in any soil in sufficient quantity to obviate the necessity of artificial infection, but as a rule the necessary conditions, such as efficient moisture, &c., are lacking. Also old spent Chinch bugs are more susceptible than young. Other and more effective methods are described.

The best results have been obtained by burning all wood, grass, rubbish, &c., where the bugs hibernate, in winter and late spring, and trapping the bugs in holes along a ploughed furrow all round a field of maize, the ridge of which has been smoothed over and coated with crude oil, tar, or some other repellant. The migration of the bugs

is checked by the tar, and they congregate in the holes in large numbers. The holes are then filled in and stamped on, and fresh holes dug.

D. M. C.

Romneya Coulteri, Propagation of. By S. (*Garden*, p. 25, Jan. 13, 1912).—This may be effected by seeds or root cuttings. Seed is sown as soon as ripe, but there was found a difficulty in this, for when the plants were large enough to pot off only a few recovered from the disturbance. Root cuttings are made from the suckers or thick fleshy roots, which can be obtained by a trowel from old plants. The plants should not be disturbed, as they cannot be replanted with success. The pieces of root, 2 to 4 inches long, are laid horizontally in pot or pan, and quite covered with soil; when they push out shoots they may be severed, leaving a piece of root to each shoot. The rooting medium should be loam, leaf-mould, and silver sand in equal parts.—*H. R. D.*

Rosa Moyesii. By B. (*Garden*, p. 326, June 29, 1912).—Three years ago "B." purchased this Rose and planted it in a border facing south and west. It produced only half a dozen flowers each season, and he thought it a bad doer. In the autumn, 1911, he transplanted it to a border with a south-east aspect. It has since produced a sheet of bloom of some 150 flowers, and is sending up basal shoots 5 feet high.

(The abstractor has just performed the reverse operation for a similar reason. The removal may have increased the flower-bearing capacity of the plant.)—*H. R. D.*

Roses for Perfume. By Marcel Bossière (*Jour. Soc. Nat. Hort. Fr.*, ser. iv., xiii.; May 1912).—Bulgaria has hitherto been the great centre of Rose production for the manufacture of Essence of Roses. It has been carried on by peasants mostly on small holdings, and the spirit is produced on the spot by the cultivator himself, and any large quantity of it together is liable to an unpleasant smell through faulty methods of distillation. M. Jules Gravereaux has been trying for many years to produce the perfect Rose for the production of Essence. The two kinds mostly cultivated in Bulgaria are *R. centifolia* and *R. damascena*, and M. Gravereaux has raised a new hybrid between *R. damascena* and *R.* 'Gen. Jacqueminot,' this being again crossed with *R. rugosa*. The result, which he has called 'Rose à Parfum de l'Hay,' is, however, said to be inferior in vigour and floriferousness to a production of M. Cochet's 'Roseraie de l'Hay,' which is now being cultivated on a fairly large scale in Provence and Germany for the purpose of distillation and is said to be inaugurating a profitable industry.—*M. L. H.*

Rhododendron Smirnowi (*Die Gart.* p. 147; March 16, 1913; with illustration).—One of the most distinct and showy of the perfectly hardy species. A native of the Caucasus. It is a handsome evergreen

shrub, forming a close compact bush, with thick coriaceous leaves covered with silvery tomentum beneath, as well as the stem and petioles. The large flowers are bright purple. It grows best planted in full sun, and does not mind exposure to wind as do many other species of the same class.—*G. R.*

Roses, Three New (*Rev. Hort. Belge*, No. 4, p. 61, Feb. 15, 1912 ; plates).—Three new Roses produced by Messrs. Soupert and Notting are said to be valuable acquisitions.

'Comtesse Felicie Hoyos' (cross between 'Ant. Onivire' and 'Mme. Mel. Soupert') is light salmon-yellow in colour, shaded coppery pink centre.

'Maman Lyly' (cross between 'Mme. Mel. Soupert' and 'Mrs. Peter Blair') has a perfectly-shaped flower resembling a 'Souv. de la Malmaison.' Tender flesh-pink in colour. Surpasses all others of that shade.

'Tito Hékéyan' (cross between 'Mme. Mel. Soupert' and 'Lady Ashtown'). Very large flower, colour coppery coral pink, shaded with yellow ; centre bright purply coral. A new type of hybrid tea. Very floriferous. Inestimable for all uses.—*M. L. H.*

Seeds, After-ripening of. By Sophia Eckerson (*Bot. Gaz.*, pp. 286–299 ; April 1913).—The author finds that the delayed germination of *Pinus sylvestris*, *P. Strobus*, and *P. Cembra* is not due to coat characters. No shortening in the time necessary is produced by removing the seed-coats. Seeds of *Fraxinus excelsior* sown in spring do not germinate till the following spring. The ether treatment hastens growth at the beginning and near the end of the resting period, but not in the middle period. Shoots immersed in water at 35° C. produced buds earlier than those untreated. The warm-bath treatment increases respiration and some have hastened germination of potato tubers and Lily of the Valley by this means. There is, however, no lasting effect unless the bulbs are kept at a high temperature. Both zero temperature and injury increase the sugar content.

Development of buds may be hastened by injury (in which case the shoots are, or may be, abnormal), by immersion in dilute solutions of alcohol or sulphuric acid, and by standing the cut ends of shoots in Knop's solution, also by radium emanations.

Removal of seed-coats assists germination of *Crataegus* seed, but only 2-5 per cent. germinate. With *C. mollis*, intact seeds require a year to germinate, but germination is delayed even with all coats removed.

The author finds a very gradual though constant increase in the acidity and in the enzymes during the whole after-ripening period. After eighty to ninety days at 5° C., when acidity has almost reached its maximum, the fats begin to break up and sugar appears with oxidase. Hydrocyanic acid appears after seventy-five days and increases up to germination, then decreases.

Acids (dilute) or strong alkalis (potash and sodium) sometimes increase percentage of germination. Fatty acids in dilute solutions shorten the after-ripening period of both hawthorn and apple. Acetic acid has been used with good results on seedlings of both Indian corn and tomato. Hawthorn seeds treated with N/1000 acetic acid attain an enzyme reaction equal to that of untreated embryo after ninety days. The more dilute solutions of butyric and hydrochloric acid were also effective. There is some correlation between acidity of the hypocotyl of *Crataegus*, its water-absorbing power, production of enzymes, and germinating power. The acidity may cause the liberation of enzymes.—*G. F. S. E.*

Shrubs from Cuttings, Propagation of. By B. (*Garden*, p. 399, Aug. 10, 1912).—Two kinds of soil are sufficient for most shrubs, one in which peat and the other loam predominates, in either case one-third silver sand being added.

Clean pots, 3 to 6 inches in diameter, are best. Young shoots are in best condition for rooting when they are a little firm, those requiring entirely cool treatment being somewhat more firm. In the third week in May cuttings of Diervillas; Forsythias; and *Philadelphus* may be taken, and in a warm propagating case or hot-bed will root in a fortnight.

June and July are suitable for *Spiraea*, *Prunus triloba*, *P. japonica fl. pl.*, *Escallonia*, *Kerria japonica*, species of Rose, Laurel, *Aucuba*, Tree Ivy, *Olearia*, *Cornus Spaethii*, *Viburnum*, Honeysuckle; July and August for Heaths, Rhododendrons; and the like. With Heaths great care must be taken in trimming the leaves from the lower parts; if the bark is injured the chances of rooting are diminished. Cuttings in cold frames should be dibbled into the soil of the frame. *Berberis stenophylla* and the double Gorse root well in this way, but are a failure in heat. Brooms, conifers, such as variegated Yews; root well in this way, also varieties of *Cupressus*, *Thuya*, and Hollies.—*H. R. D.*

Sinomenium diversifolium. By W. B. Hemsley (*Gard. Chron.*, p. 402; November 30, 1912; with fig.).—This has been known in gardens as *Cocculus variiformis*. This note refers to its naming, habit and history, and the male inflorescence is figured.—*E. A. B.*

Snowdrops. By S. Arnott (*Garden*, p. 9, Jan. 6, 1912).—*Galanthus nivalis*, the common snowdrop, beside its less graceful but pleasing double form, has given rise to many other forms, though a good number are only in the hands of a few enthusiasts. One of the finest is the South European form, *G. nivalis Imperati*, a noble form, but not so reliable as some forms as our smaller ordinary snowdrop. The best variety of *Imperati* is *Atkinsii*, but *Pseudo-Atkinsii* is also very fine. Among others are the so-called yellow snowdrops, which have yellow instead of green markings. *Lutescens* and *flavescens* are the single yellows, and there is also a double one. The green *G. n.*

virescens is a singular flower, marked and shaded with green on the exterior. Of other snowdrops the best known is *G. Elwesii*, the giant snowdrop of Asia Minor. It is variable, and some forms are inferior. The varieties *Cassaba*, *unguiculatus*, and *Whittalli* are the best. *G. plicatus*, the Crimean snowdrop, is an old occupant of British gardens and is easily recognized by the leaves being plicate or folded back at the margins. It is handsome, and its best varieties are the Straffan one and *G. p. Fraseri*. Hybrids between this and *G. nivalis* have been raised. *G. Ikariae*, with broad green leaves and fine flowers, is handsome, and recommended in place of *G. latifolia*, another green-leaved species.

Autumn-flowering Snowdrops.—Some of these are delicate, and the author has found they have all shown a tendency to come into line with the ordinary one in time of flowering, though this is not the experience of all. *G. cilicius*, though later than some, is the most reliable; but *G. octobrensis*, *G. corcyrensis*, and *G. Elsae* are all prized by their owners.

The snowdrop will grow anywhere, but deep planting gives the finest flowers. They are charming for table decoration, arranged with green ivy or moss as a foil. If wet sand is used instead of water, each stem will stand erect in the desired position.—*H. R. D.*

Snowdrops, Pure white. By S. Arnott (*Garden*, p. 118, March 9, 1913).—Forms in which the green markings are absent are found in *poculiformis*, which has the inner segments as long or nearly as long as the outer, giving the flower an attractive appearance, and *Galanthus nivalis albus*, which is not so pleasing and has a tendency to throw flowers with a few green markings.—*H. R. D.*

Sodium Plants. By W. J. V. Osterhout (*Bot. Gaz.*, pp. 532–536; Dec. 1912; with 2 figs.).—The author experimented with *Phyllospadix*, *Ulva*, *Porphyra*, *Egregia*, *Nitaphyllum* and *Chondrus*. He found that sodium is as necessary for these plants as it is for animals, and that NH_4, Ca, Mg, K, Ba, Sr, Cs, Rb, and Li are decidedly injurious when used in sea-water instead of sodium. The best substitutes are other kations, such as Mg, Ca, and K. Each of certain salts has a specific action on life processes.—*G. F. S. E.*

Soil Analysis, Modification of the Method of Mechanical. By C. C. Fletcher and H. Bryan (*U.S.A. Dep. Agr., Bur. Soils, Bull.* 84; 7 plates).—Instructions are given in detail for separating the dried soil into gravel, four grades of sand, silt and clay. Plates and diagrams with detailed description are given of the apparatus as in use by the Bureau, including sieves and shaking machine for eliminating the sands, and centrifuge for dividing finer portion into "silt" and "clay." Distilled water is used, which the authors prefer to apply under pressure. Ammonia is used to keep the soil particles deflocculated. The sand and silt are dried and weighed in platinum, and the clay in enamelled-ware cups.—*W. A. V.*

Soil Bacteria to Evaporation, The Relation of. (*U.S.A. Exp. Stn., Wisconsin, Bull.* 23; April 1912)—The conclusions drawn from the experiments are that bacterial action increases the rate of surface evaporation from soils.

The bacteria do not of themselves cause the increase, but the by-products which are formed greatly influence the factors which go to make up the movement of soil water.—*G. P. C.*

Soils, Examination of, for Organic Constituents. By Oswald Schreiner and Elbert C. Lathrop (*U.S.A. Dep. Agr., Bur. Soils, Bull.* 80; 2 plates, 1 table).—It is known that certain soils are unfertile, although chemical analysis shows them to contain all that is generally recognized as essential in a sufficient quantity. Experiments have proved the presence in such soils of some toxic substance or substances, soluble in water, which are inhibitory to healthy plant development; and the authors of this bulletin, having satisfied themselves that such substances were organic, are undertaking a systematic research with a view to isolating and identifying such contents. Their experiments have spread over a large number of soils from various parts in the States. They have already isolated a large number of organic substances, including dihydroxystearic acid, various paraffin hydrocarbons, organic acids, esters, alcohols, carbohydrates, pyridine derivatives, &c. The work is still being carried forward and further results are promised. Methods adopted are clearly shown. Some experiments are also detailed showing the noxious effect of dihydroxystearic acid upon wheat seedlings.—*W.A.V.*

Soils, Salt, Plants for. By J. Brichet (*Rev. Hort. de l'Alg.*, No. 8, p. 251, Aug. 1912).—From his experiences with the salt soils of Northern Africa the writer has compiled a list of plants, trees, and shrubs which it is possible to grow:—

1. Where the soil contains no chloride, but where watering can be done only with brackish water.

2. Where the soil contains not more than 5 or 6 per cent. of chlorides and where watering is done with water containing not more than 3 per cent. of salt.

3. Where the soil contains 5 per cent. of chlorides and where irrigation water contains 5 per cent. of salt.

In many cases the cultivator may prevent the salt in soil or water from accumulating until it arrives at poisonous doses.

With salt but permeable soils, where fresh water is obtainable, a system of drainage can sometimes be installed in which the irrigation water dissolves and carries away the excess of salt. On the other hand, when brackish water has to be used as little watering as possible should be done during hot weather, and the soil should be well tilled directly afterwards. This prevents the water charged with salt from rising to the surface to evaporate and deposit its salt there until all surface growth becomes impossible.

The writer mentions a salt-water lake in the North of Africa in which, during hot weather, the evaporation is so much faster than the supply of water from the sea that its contents become too salt even for the seaweeds, which die from that cause.—*M. L. H.*

Spruce Disease. By P. Spaulding (*Mycologia*, iv. p. 151; May 1912).—Attention is called to a disease of *Picea excelsa* resulting in the defoliation of even large trees. It is caused by the fungus *Phoma piciena*, which also attacks *Picea rubra*. Burning the fallen needles and spraying with fungicides to prevent the spread of the disease are recommended.—*F. J. C.*

Spruce, Protecting from Frost. By W. Hall (*Trans. Scott. Arbor. Soc.*, pp. 51–53; July 1913).—Alder planted with young spruce in places where the soil is very wet in winter have proved an excellent protection. In another case birch has also proved a protection.—*W. G. S.*

Strawberries, Forcing by Etherization. By M. G. Bultel (*Jour. Soc. Nat. Hort. Fr.*, ser. iv., xiii., p. 212; April 1912).—An article on forcing strawberries by two methods, viz. etherization and by immersion in hot water. The writer gives comparative tables showing the decided advantage in early maturity gained by the treatment with ether, and though he points out facts which would seem to be against the alternative method of hot water baths he promises to investigate this matter again another season and to publish the results in the same detail. His theory at present is that it will be found impossible to immerse the dormant shoots of the plants without completely soaking the whole ball of earth, and so much moisture to the roots at that stage of their growth is considered to have bad effects.
M. L. H.

Sulphur, The Fertilizing Action of (*Rev. Hort. Belge*, No. 20, p. 328, Oct. 15, 1912).—A communication by Messrs. Boulanger and Dugardin to the Académie des Sciences seems to show that the addition of small doses of flowers of sulphur to potting soil has beneficial effects. The sulphur does not act directly, but it stimulates the action of useful microbes in the soil, and as through such action additional nitric matter is made assimilable by the plants, more organic nitric manure must be supplied to make up for this increased consumption.
M. L. H.

Tobacco Extracts, Comparative Value as Insecticides. By W. O. Hollister (*Jour. Econ. Entom.*, v. pp. 263-267; June 1912).—Tobacco is one of the earliest substances to be recommended as an insecticide, having been used certainly as early as 1763 against aphides, in the forms both of tobacco water and tobacco powder. It is still one of the most useful contact sprays we have.

It was found that a solution of pure nicotine was as efficient as tobacco extract and more cleanly in use, while it is free from the other constituents of tobacco which are nauseous and injurious. Nicotine sulphate possesses no advantage over the uncombined product.

A one per cent. solution killed 85 to 90 per cent. of the insects plunged into it for one minute, while a two per cent. solution killed 98 to 100 per cent.—*F. J. C.*

Tomato Blight. By H. S. Reed (*Phytopathology*, ii. pp. 250–252; Dec. 1912).—Two or three generations of plants were grown from seeds taken from fruits of tomato attacked by *Phytophthora infestans*. Mycelium was found in the seeds in some cases; but *Phytopthora* did not appear to be carried over to succeeding generations by the seed. Plants from such seed, especially when it was derived from ripe diseased fruits, proved weakly and somewhat chlorotic, while the fruit they produced was small and bitter.—*F. J. C.*

Tomato, Cultivation of, in the Province of Parma (*Jour. Soc. Nat. Hort. Fr.*, ser. iv., xiii., p. 309; June 1912).—The cultivation of the tomato has become a very important industry in the province of Parma of late years. It is computed that about a million and a half of quintals of tomatos was produced in the province last season at an average price of about 6 francs per quintal. The cultivation of the plants employs whole families, including old men and children, not of the regular peasant class, but who devote themselves to this special branch of horticulture during part of the year. The landlord lets out plots of land ready prepared to such families, who plant, grow, and gather the fruit, which is sold before it is ripe to big tomato preservers. These last buy the produce of so many hectares at a fixed price per quintal, the crop to be delivered in consignments as it is ready for marketing. The results of the sale are divided between the owner of the land and the cultivator. It has been found that the skin and seeds from which the flesh has been removed for preserving can be dried and made to produce an oil of varying degrees of value according to the method of its extraction, and even when that has been removed what is left is made up into cake for feeding cattle.—*M. L. H.*

Tomatos, Changes taking place during the spoilage of, with methods for detecting spoilage in Tomato Products. By H. W. Wiley (*U.S.A. Dep. Agr., Bur. Chem., Circ.* 78).—It is easy to detect spoilage in tomato pulp or canned tomatos, as such products when perfectly sound contain a considerable percentage of citric acid and invert sugar, but no volatile acids. The reverse is the case with spoiled samples. It has been found possible to determine the condition of the tomatos before canning, etc., even in the case of tomato ketchups and sauces, by determining the nature of the acids contained.

A considerable number of chemical tests for the various acids are given.—*D. M. C.*

Toxic Excreta of Plants. By F. Fletcher, M.A. (*Jour. Agr. Sci.* iv. pp. 245–247; Jan. 1912).—The writer has already pointed out that *Sesamum indicum* seedlings die when they have reached a height of a few centimetres if planted at a distance of two feet from Sorghum. This was observed at Surat on black cotton soil of a retentive nature in a district with a rainfall of 42 inches per annum. A series of experiments carried out at Gizeh in Egypt, where the rainfall is zero and the water supply under control, corroborate the idea that the grass produces a substance poisonous to *Sesamum*. Maize and sesamum were sown in alternate rows, and an account of the method of treatment of the plants is given. The result was that the sesamum between two rows of maize remained very small, while that with a row of maize on one side did not attain a third of the size of isolated plants.—*F. J. C.*

Transplanting, Unintentional. By H. S. Coward (*Bot. Gaz.*, pp. 80–84; Jan. 1913; with 2 figs.).—The author found 60 species of flowering plants and a fern developing on an apparently denuded area near Cold Spring Harbour. Of these 39 were long-lived perennials and had been unintentionally transplanted through pieces of root or rhizomes. Small pieces of roots of *Myrica, Sassafras, Rubus, Robinia, Lespedeza, Rhus,* and *Asclepias* gave rise to new plants. *Aralia nudicaulis, Smilax, Lespedeza* grew from pieces of the rhizome. During resting period of vegetation most plants can be transplanted even by very rough methods.—*G. F. S. E.*

Tree-Growth. By Harry P. Brown (*Bot. Gaz.*, pp. 386–403; Nov. 1912; with 2 plates).—The "cambial awakening" began in *Pinus rigida* at Ithaca, New York, as early as April 15, which agrees with general observations in middle Germany, where it has been noted on ten-year-old Scotch fir on April 20 (it is generally supposed to begin between latter half of April and first half of May). Larch and White Pine begin last week in April.

Most authorities state that growth begins first in the youngest branches and makes its way slowly downwards. The author finds that it begins first (in *Pinus rigida*) some distance below the apex, but in nineteen days gradually spreads upwards and reaches the apical shoot. It may take a long time to reach the base of the tree, especially if it is old, surrounded by vegetation, and covered with thick bark.

Growth in the branches follows the same rule and their cambium awakes at almost the same time, but growth of the lateral shoots lags behind that of the main stem.

The most rapid increase in diameter occurred on the terminal shoot between June 6 and 15, and elsewhere May 25 to June 6.

The width of the complete ring decreases from apex to base; the living portion of the cortex reverses this rule.

No appreciable difference was recorded between the times of awakening on the north and south sides of the tree.—*G. F. S. E.*

Tree Plantations, Treatment of Artificial. By Edmund Secrest (*Ohio, U.S.A., Exp. Stn., Circ.* 110; Feb. 25, 1911).—Chiefly embodying the well-known facts that in order to be successful thorough preparation of the ground, careful planting, and the best systems of after-management should be adopted. Pruning of certain species, particularly the Catalpa, is strongly recommended.—*A. D. W.*

Tulips, Forcing of. By T. W. (*Gard. Chron.*, p. 403; November 30, 1912).—Practical instructions for forcing early-flowering varieties.
E. A. B.

Viburnum coriaceum. By W. B. Hemsley (*Gard. Chron.*, p. 363; November 16, 1912; with fig.).—A critical note on introduction and nomenclature and this figure, the first drawn from the living plant.
E. A. B.

Vine, a New Enemy of the (*Jour. Soc. Nat. Hort. Fr.*, ser. iv., xiii., p. 78; Feb. 1912).—A parasite of the vine, *Osyris alba*, has been spreading in the South of France and is said to have most disastrous effects on all invaded plants. It should be ruthlessly destroyed, therefore, wherever it is found in the vicinity of vines. (See *Journal R.H.S.*, xxxviii. p. xxxvii.)—*M. L. H.*

Vitis cordifolia, Composition of the Sap, Leaves and Stems of. By Oliver M. Shedd and Joseph F. Kastle (*Jour. Amer. Chem. Soc.* 34, pp. 1415–1424; 1912).—The authors investigated the distribution of the mineral constituents in the different parts of this wild grape vine. The percentages of the various oxides are given separately, showing that there is a considerable accumulation in the leaf, less than half the amount in the stem, and only a small proportion in the sap, but the proportionate distribution varies considerably with the different constituents.—*W. A. V.*

Water-Culture Experiments. By Conrad Hoffmann (*Bot. Gaz.*, pp. 244–248; March 1913; with 3 figures).—The author finds that paraffin blocks, moulded and perforated, give better results than the corks usually employed for seedlings to be grown in nutrient solutions. The mould is made of heavy paper folded into cylinders of the diameter required, and perforated first by a small borer throughout, and then by a larger cork borer through the upper part only.—*G. F. S. E.*

Weeping Trees. By D. (*Garden*, p. 388, Aug. 3, 1912).—The shade of weeping trees is very acceptable in hot weather, but all are not suitable for the same purpose. According to their habit they may be divided into three groups: (1) trees on which every branch is pendulous; (2) trees with an upright leader and moderately straight main branches, with the secondary branches pendulous; (3) trees with contorted growth, the main shoot bending over.

First Group.—Trees of this group are best where shade is the first

consideration ; it may be necessary to stake the central branch to get the desired height. Vigorous trees of this group: the Weeping Ash (*Fraxinus pendula*) and the Weeping Wych Elm (*Ulmus montana pendula*), the Weeping Holly (*Ilex aquifolium pendulum*), the Weeping Thorn (*Crataegus monogyna pendula*), and the Weeping Beech (*Fagus sylvatica pendula*) ; the Weeping Cherry and the Weeping Sophora are less useful for garden purposes.

Second Group.—These are best for landscape effect. Young's Weeping Birch (*Betula alba pendula Youngii*) belongs here, and is one of the most graceful. The Weeping Willow may also be included, especially *Salix babylonica* and its variety *S. b. Salamonii*, also the weeping form of *S. purpurea*, but the outline is less graceful ; an ash, *Fraxinus excelsior Wentworthii* ; a beech, *Fagus sylvatica borneensis* ; two elms, *Ulmus glabra pendula* and *U. campestris micrcophylla pendula*, and one form of *U. montana* ; and the beautiful conifer, *Picea Morinda*. *Cupressus nootkatensis* and the various Larches are of graceful outline.

Third Group.—This is typified by the Weeping Beech var. *miltonensis*, and of similar outline is the weeping form of the White Mulberry (*Morus alba pendula*). Several pendulous forms of the common Spruce may be obtained, but they are not ornamental. The same may be said of the Weeping Apple, the Weeping Hemlock, Spruce, and one or two Weeping Plums and Cherries.

Only a few of the best should be selected and should be generously treated.—*H. R. D.*

Western Pines, Possibilities of, as a Source of Naval Stores. By H. S. Betts (*U.S.A. Dep. Agr., For. Serv., Bull.* 116 ; Oct. 22, 1912).—The ever-increasing demand for rosin and turpentine, particularly in connexion with naval stores, has caused inquiries to be made as to whether the Western Pine is likely to fill the place of the Yellow Pine, which is now sadly on the decrease, in furnishing the products of the forest. Experiments in Arizona showed that the yield from Western Yellow Pine was about four-fifths as great as that from the Yellow Pine.—*A. D. W.*

Wood-using Industries and National Forests of Arkansas. Part 1. "Uses and Supply of Wood in Arkansas." By J. T. Harris. Part 2. "Timber Resources of the National Forests in Arkansas." By Francis Kiefer (*U.S.A. Dep. Agr., For. Serv., Bull.* 106 ; April 30, 1912).—The number of uses to which timber is applied is surprising. Thus for boxes and crates, vehicles, handles of tools, chairs, baskets, coffins, boots and furniture, vast quantities of wood are used, while the boat-builder and trunk-maker still further add to the quota.—*A. D. W.*

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PART II.

INVESTIGATIONS ON THE CONTROL OF DISEASE IN PLANTS.

By Prof. R. H. BIFFEN, M.A.

[Read July 15 and 29; Lieut.-Col. Sir DAVID PRAIN, F.R.S., V.M.H., in the Chair.]

[BEING THE NINTH AND TENTH MASTERS MEMORIAL LECTURES.]

IN choosing the control of disease in plants as a subject for the Masters Memorial Lectures for this year I have been largely influenced by the fact that it is commonly assumed, and I think rightly, that the losses caused by disease are becoming increasingly serious. Apart altogether from the fact that our rapidly extending knowledge of fungoid pests has led to the recognition of many new diseases, the importance of the subject has increased owing to those economic changes which have led to the cultivation of larger areas of one and the same kind of plant. In growing fruit, for instance, it is now a common practice to plant considerable breadths of one variety only, instead of, as one sees in the older orchards of the west of England, a mixture of different varieties. Should this single variety prove susceptible to any particular disease, that disease has every opportunity of spreading throughout the area—as silver-leaf has spread wholesale in orchards of 'Victoria' plums, for instance—whereas in mixed plantations only occasional trees would be attacked. Again, crops are grown on a larger scale than was formerly the case. Potatos, for instance, form an almost continuous network in some counties, with the result that an epidemic starting in one locality, given favourable conditions of weather, can quickly spread over the whole area. Further, the

increasing rapidity of transport nowadays is leading to the importation of plants from abroad in ever-increasing amount, with the result that fungoid pests are introduced with them. These may, or may not, obtain a hold in this country, but when they succeed in establishing themselves, as the potato disease and American gooseberry mildew have, the consequences are often particularly serious. Unfortunately these unwitting importations of disease are often made by persons with little or no knowledge of the harm that may result, and the disease is established ineradicably before it is recognized and means taken to stamp it out. Such a state of affairs can only be dealt with by legislation and a thorough control of such importations by the State, though even under such conditions it is very problematical whether diseases we do not at present possess can be kept out indefinitely.

I propose then to deal briefly with the methods which are being tried, for the most part experimentally, for the control of plant diseases, limiting the subject to diseases caused by the attacks of parasitic fungi.

The most popular method unquestionably is to coat the plants on which disease has either appeared or is expected to appear with a dust-like film of some fungicide, applying it in the form of a fine spray or as a powder, preferably the former. Many fungicides are now in use, some suitable for one disease, some for another. No universal specific has yet been found, in spite of endless investigations during the last decade or so.

Of all the fungicides now in use, Bordeaux mixture is unquestionably the most important. It can be relied upon to keep more than one of the worst of the fungoid diseases in check, yet even in the case of the potato disease (*Phytophthora infestans*) large growers are occasionally met with who consider that the drawbacks to its use are greater than the undoubted benefits it confers. They argue that in wet seasons, when the disease is most prevalent, spraying can only be carried out with difficulty; that the repeated sprayings frequently necessary are costly; that the preparation of the mixture requires more skill than their employees possess; and finally that spraying so delays the maturation of the crop that it cannot be lifted until some three weeks later than an unsprayed crop. The cumulative effect of these drawbacks is that many prefer to risk the partial destruction of their crops season by season. Yet this particular disease is perhaps more readily kept within limits than any other serious one attacking our crops, and moreover the mere coating of the plants with the fungicide undoubtedly, apart from all questions of preventing losses, increases the crop considerably.

In such circumstances it is hardly to be wondered at that there is a tendency nowadays to look for other methods of controlling the outbreaks of disease caused by parasitic fungi.

Where crops are grown under glass, and consequently such conditions as temperature, water-content of the atmosphere, and again of the soil are largely capable of control, a certain amount can be done

towards providing external conditions unsuitable for the growth of these pests. Nevertheless commercial crops of such plants as cucumbers are deliberately grown under the identical conditions the mycologist uses when he requires to carry out infection experiments. The plants are forced as rapidly as possible, with the result that the tissues are far more succulent than they should be, and the high temperatures and saturated atmosphere, often so requisite for the germination of fungus spores and the growth of their mycelium, are provided. In such circumstances one cannot wonder that the plants readily fall a prey to fungoid attacks which, under such conditions, are excessively difficult, if not impossible at present, to cope with. There can be little doubt that critical investigations on the best methods of cultivating such plants under glass would modify existing methods in a direction which would provide less ideal conditions for the spread of fungoid pests. Even in the open much can be effected by a judicious choice of external conditions. Larch canker, for example, has to a certain extent been kept under control by avoiding planting in situations known to offer especially favourable conditions to the fungus causing it.

Whilst temperature and water-content in many cases play an important part in the incidence of plant diseases, the supply of food and other materials in the soil is often of the greatest importance. The rapidly increasing employment of artificial manures is gradually calling attention to this fact by demonstrating that the more intensive cultivation becomes the more plant diseases abound. As evidence for this the following table showing the intensity of an outbreak of yellow rust on the wheat plots at Rothamsted is worthy of some attention.* Throughout the plots the variety of wheat grown was the same, the plots only differing in the manurial dressing applied. This is given in column I., whilst in column II. are marks assigned to each plot on the basis that 0 indicates no disease, 12 an excessively bad attack.

TABLE.

I.—Manure.	II.—Extent of Disease.
None	1–2
Minerals	2
Minerals + 200 lb. ammonium salts	3
„ + 600 lb. „ „	3–4
„ + nitrate of soda	3
Ammonium salts only	6–7
„ „ and superphosphate	10
„ „ „ „ and sulphate of magnesia	12
Ammonium salts / Minerals } alternating each season	3–4 / 0
Rape cake	8
Minerals + 550 lb. nitrate of soda	9–10

A similar investigation of the manurial wheat plots on the Woburn Experimental Farm of the Royal Agricultural Society revealed a very similar state of affairs, whilst water-culture experiments designed

* BIFFEN, R. H., *Journ. Agric. Sci.* vol. iv. p. 425.

to test the matter further gave similar results. The results may be summarized by saying that susceptibility to this particular disease is increased by supplying the growing plants with large amounts of available nitrogen. There is little to choose, as a rule, between the evil effects of nitrate of soda and of sulphate of ammonia. On the other hand, mineral manures, more especially the salts of potash, decrease susceptibility, whilst starvation, *e.g.* on the unmanured plot which has grown wheat continuously for many years, leads to a marked degree of disease-resistance. In fact, by starving highly susceptible varieties practically immune plants can be grown. Unfortunately such treatment, though it checks the incidence of disease, does not lead to the production of profitable crops, and the most the cultivator can do is to strike a balance for himself and decide, as far as may be, what particular system of manuring will give him, on the whole, the most profitable crop. It is too early to say yet how far these results apply generally, but tentative experiments carried out with Roses, Hollyhocks, and Chrysanthemums seem to indicate that dressings of potassium phosphate may help considerably in preventing severe attacks of the diseases these plants are liable to.

These observations suggested an interesting line of inquiry which is being followed up by SPINKS,* namely, the effects of various salts, not usually available for plant growth, on the disease-resisting capacity of plants. His preliminary observations were made at the Pot Culture Station at Woburn. Here cultures of wheat were being grown under uniform conditions, except that traces of salts had been added to the soil. The plants had become attacked with the common mildew, *Erysiphe graminis*, and there was no reason for supposing that all of the plants had not had precisely the same opportunities for becoming infected. The cultures growing in normal soil were moderately attacked, the intensity of the disease being expressed by 4 marks. The addition of magnesia resulted in a more severe attack, 8 marks being assigned to these cultures. Zinc salts gave variable results. The carbonate slightly decreased the severity of the attack as compared with the control plants in normal soil (3 and 4 marks respectively), the phosphate produced no effect on the amount of the disease, whilst the nitrate increased the severity of the attack to an extraordinary extent (10 marks). The corresponding salts of lead gave much the same result, the nitrate again markedly increasing the amount of mildew present. The addition of traces of lithium salts, on the contrary, served to diminish the severity of the attack. The phosphate and carbonate produced practical immunity in the plants, whilst, with the exception of one case, the nitrate also diminished the amount of disease compared with that on the control plants. Various experiments have since confirmed and extended these results, and we now have to recognize that the merest traces of different salts may profoundly modify the plant's susceptibility to disease. The lines these observations open up look to be of great promise, for they indicate the

* SPINKS, *Journ. Agric. Sci.* vol. v. p. 231.

possibility of controlling disease by the addition of almost negligible amounts of salts to the soil.

A still more direct way of minimizing the losses caused by fungi is to cultivate disease-resistant plants. It appears to be almost invariably the case that when many varieties of any plant are grown under the same external conditions they show considerable differences in their capacity to resist disease. Some few may even be found which are practically immune.

Unfortunately, immunity to any particular disease is not necessarily associated with other characters almost equally desirable from the cultivator's point of view. For instance, the potato 'Evergood' possesses a considerable capacity to withstand the attacks of *Phytophthora infestans*, but it can never come into such general cultivation as the susceptible 'Up-to-Date,' simply because in many districts the quality of its tubers is far from desirable. Hence the question arises whether immunity to disease and its converse susceptibility are heritable characters. If so, it would seem possible by cross-breeding to associate the valuable feature of immunity with the other characteristics the cultivator requires.

A brief survey of more than one of our garden plants indicates that such is the case, but really critical data are difficult to obtain, owing to the lack of precise knowledge with regard to the origin of many, if not of most, garden varieties. The numerous varieties of Roses in cultivation nowadays provide the best evidence in this direction, and fortunately the pedigrees of many are known with some degree of certainty. Further, the Rose is ideal from another standpoint, though possibly one not appreciated by the grower, for it happens to be attacked by a considerable number of fungoid pests, chief of which are the rose mildew, orange rust, and black spot. These fungi appear with great regularity each season, and consequently offer good material for investigating the phenomena of disease susceptibility.

Three groups of "florists'" Roses are generally recognized. These are the Teas, the Hybrid Perpetuals, and the Hybrid Teas. The Teas and Hybrid Perpetuals form two sharply marked groups easily distinguished by their foliage and floral characters. The third group, the Hybrid Teas, have resulted from crosses between members of the first two groups. Some are first crosses, others seedlings from first crosses. Naturally the limits of the group are somewhat ill-defined, and the raisers of new Roses often arbitrarily class their novelties as Hybrid Teas when the ordinary observer is inclined to put them in other groups. This is in part due to the fact that it is not generally recognized that when such first crosses are again crossed the resulting offspring shows segregation into each of the three classes. The Tea Roses as a group are characterized by the fact that they are, to quote FOSTER MELLIAR, "particularly exempt from orange rust." The Hybrid Perpetuals, on the other hand, can fairly be described as particularly susceptible to it. The Hybrids from these two groups are worthy of extended investigation with regard to their capacity

towards resisting rust. A somewhat cursory survey shows that some are as susceptible to orange rust as the Hybrid Perpetuals. Examples which will occur to most rose-growers are 'Mrs. W. J. Grant,' 'Lady Ashtown,' 'Liberty,' and 'Camoens.' Climbing "sports" of the first three exist, and these in turn are as susceptible as the types from which they sprang. Other varieties, on the other hand, possess a marked degree of resistance. Amongst such are 'Laurent Carle,' 'Edme Metz,' and 'Princess Marie Mertchertsky.' Further, some of the newer Tea Roses are rust-susceptible. As an example that superb Rose 'Mrs. Foley Hobbs' must suffice. Its pedigree is unknown to me, and I can only hazard a guess that a Hybrid Tea carrying the factor for susceptibility was one of its parents.

The incidence of the rose mildew on the newer races of Roses again points to the fact that immunity and susceptibility are transferable on cross-breeding. The new race of Wichuraiana Roses, which have so altered the appearance of our rose gardens in the last few years, gives almost convincing proof of the fact. These Wichuraianas are descended from the species *Rosa Wichuraiana* crossed with various Teas, Hybrid Teas, Hybrid Perpetuals, &c. The species itself shows an intense degree of resistance to mildew, whilst this is not necessarily true of the other parents. It is customary to speak of the whole class as being mildew-proof, the hard, polished leaves being supposed to be impenetrable by the fungus. As a matter of fact, many are badly attacked during mildew years, and if one looks up the pedigrees of these varieties one finds that susceptible forms have been used in their up-building.

'René André,' for instance, is *R. Wichuraiana* × 'L'Idéal,' 'Diabolo' is *R. Wichuraiana* × 'Xavier Olibo,' 'Léontine Gervais' *R. Wichuraiana* × 'Souvenir de Catherine Guillot,' 'Dorothy Perkins' *R. Wichuraiana* × 'Mme. Gabriel Luizet'; whilst the latest comer, 'Wich-Moss,' has inherited the habit and foliage of *R. Wichuraiana* and the multitudinous prickles of the Moss Rose, together with its susceptibility to mildew.

The third disease, black spot, is at present far less common than either rust or mildew, though it appears to be becoming more abundant each season. It is, as a rule, common on the Persian Yellow Rose. This variety crossed with 'Antoine Ducher' gave the equally susceptible 'Soleil d'Or,' which in turn "sported" the susceptible 'Soleil d'Angers.' The former has been the starting-point of the new race of Pernettiana Roses. It is early to speak of the incidence of black spot on these, but one of the most widely grown, the 'Lyon Rose,' rarely fails to provide me with an outbreak of the disease.

A vague recognition of similar facts has led plant-breeders to make the attempt to transfer the feature of immunity definitely to varieties good in other respects, but lacking it, with some measure of success.

Orton and his colleagues,* for instance, have bred new varieties of Cowpeas and Water-Melons resistant to a wilt-disease caused by the

* Orton, C.R. IVe, *Con. Inter. de Génetique*, p. 247.

attacks of a *Fusarium*. In the former case a resistant variety, 'Iron,' was found in cultivation in South Carolina. This was crossed with the more widely grown and more prolific variety 'Whip-poor-Will,' and amongst the descendants of the cross-bred plants, varieties resistant not only to the fungoid disease but to a common insect disease causing knots and nodules on the root system were found. In the latter case a starting-point could not be found amongst the edible Water-Melons, but an inedible Citron-Melon was found to be wilt-resistant. This, crossed with the Water-Melon 'Eden,' finally gave a few edible resistant plants which have proved the forerunners of new races suitable for cultivation in districts where "wilt" is particularly prevalent.

If, however, any definite progress is to be made in the work of raising disease-resistant plants, more precise knowledge is necessary with regard to the mode of inheritance of this feature. The days of chance results in plant-breeding are over. We have long passed the stage when the breeder vaguely recognized that crossing "broke the type," and crosses were made at hazard in the hope that among their descendants improvements on the parents would occur.

The investigation of the subject has its own special difficulties. To begin with, it is as well to work with some fungoid disease which can be relied upon to appear with regularity each season and sufficiently intensely to attack every susceptible plant. Further, the mortality amongst infected plants should be as slight as possible, for if it is at all pronounced the experiments may come to a premature end through the death of the first hybrid generation. Pronounced mortality may also upset the necessary statistical examination in the succeeding generations. Add to this such other desirable points as MENDEL postulated for his experiments, such as the existence of numbers of varieties breeding true to the features under investigation, fertility of the cross-breds, &c., and one's choice becomes exceedingly limited. Possibly wheat and its common pest in this country, namely the yellow rust, provides as ideal a subject as can be found. One or two varieties are known which are so resistant to the attacks of the fungus that they fail to become infected under the most favourable conditions. There are also numbers of moderately and very susceptible varieties which will cross readily with these immune varieties, whilst the hybrids self-pollinate with extraordinary certainty. Crosses made between such immune and susceptible varieties show dominance of susceptibility to yellow rust in the hybrid generation, segregation into immune and susceptible forms in the next generation, the two forms occurring in the proportion of one to three, whilst the immune forms breed true to this feature in following generations. If all plants showing the pustules of the rust are counted as susceptible, then the mode of inheritance is on simple Mendelian lines. The susceptibility, though, is not invariably of the same order as in the parent susceptible variety, and, to put the matter broadly, it may grade from "slight" to "extreme." It is known further that moderately resistant forms appearing in the first generation raised from the hybrid may breed true to

"moderate" susceptibility, so that the presence of factors checking the intensity of susceptibility has to be recognized.

Further, crosses made between "slightly" and "moderately" susceptible varieties often give, in the generation raised from the hybrid, forms far more susceptible than the "moderate" parent. This is particularly the case in crosses between 'Rivet' wheat (slightly) and 'Red Fife' (moderately susceptible), where forms excessively susceptible to yellow rust appear in the generation raised from the hybrid. These in turn may breed true to this feature. The statistical investigation of the phenomena is a matter of considerable importance, but unfortunately it is proving difficult, owing to the partial sterility of many of these new forms. Strikingly enough, with this increased susceptibility to a disease to which one at least of the parents is liable, one may find susceptibility to other diseases not known to occur in them. The production of races of wheat readily attacked by ergot from the cross between 'Rivet' and 'Red Fife' is a case in point.* The fact that such may occur is, however, a small matter to set against the undoubted advantages of breeding directly for disease-resistance. The recognition of the fact that immunity and susceptibility to certain diseases are capable of segregation in either a simple or complex Mendelian fashion has led to a great effort to control some of the commoner diseases to which our crops are liable, and breeding for disease-resistance has become part of the routine work of many experimental plant-breeding stations. Results in this direction cannot, from the nature of the work, be expected rapidly, though some of considerable economic significance are already to hand. Meanwhile the way for further progress might well be paved by those Horticultural and Agricultural Institutions which make trials of large numbers of varieties of the more important garden and farm plants, collecting information with regard to their susceptibility or otherwise to various diseases.

The CHAIRMAN said that he had been particularly interested in Professor Biffen's remarks, in the earlier part of his lecture, suggesting that the increased feeding of plants seemed to render them more susceptible to disease, and thought that it indicated that what is now popularly known as "intensive cultivation" might soon be on its trial for the reason stated in the lecture. He also thought that growers might themselves exert great influence in stamping out disease by insisting on receiving for their cultivation only varieties which are immune, or practically immune, from those forms of disease to which the species concerned are more commonly subject.

Mr. BATESON asked whether there was any truth in the popular view that disease-resistance was probably associated with "inferiority." Varieties might of course be inferior in many distinct ways, but perhaps small size and a deficiency of sugars or of aromatic substances were the most usual elements of inferiority in edible plants. Did Professor

* BIFFEN, R. H., *Journ. Agric. Sci.* vol. iv. p. 426.

Biffen's experience lead him to suppose that there was any physiological relationship between such defects and the power to resist diseases ?

Mr. ARTHUR SUTTON said he was very glad of the opportunity of saying a few words, more especially with regard to the diseases of the potato, which the lecturer had so ably dealt with.

Referring to the question whether the spores of *Phytophthora* affected the potato plant directly through the tubers or through the leaves, Mr. SUTTON called attention to the well-known fact that it is quite easy to grow a healthy crop of potatos from seed-tubers which were themselves very badly affected with *Phytophthora*, and in fact so long as there were some remaining eyes in a seed-tuber which were sound there was nothing to prevent a healthy crop being grown, provided the climatic conditions in the ensuing season did not favour the spread of *Phytophthora*.

Mr. SUTTON also mentioned that healthy crops of potatos were frequently grown on land which had produced a very badly diseased crop of potatos in the previous season, and the conclusion to be drawn seemed to be that the spores of *Phytophthora* only became a source of danger when the climatic conditions were favourable to their growth. In some parts of Ayrshire remarkably heavy crops of early potatos were grown on land where potatos had been grown successively for forty years—sometimes the crops being affected with disease and sometimes not, according to the character of the season.

Referring to the question dealt with by the lecturer, as to whether varieties of potatos which were immune to the attacks of *Phytophthora* could be considered in any respect "inferior" to others which succumbed to the disease, Mr. SUTTON stated that in his experience many thousands of seedling potatos were discarded because in some character or other they were "inferior" to others already in commerce. It frequently happened that seedlings which for several years showed immunity to *Phytophthora* were far less productive than others, or were in other respects "inferior," possibly in quality, or in shape, or in colour.

The general conclusion which cultivators seemed to draw was that it paid better to grow a very productive variety of good or fair quality, taking the uncertain risk of *Phytophthora*, rather than to grow sorts which would probably be immune but which would certainly yield a relatively small crop. The most immune variety of potato Mr. SUTTON has ever known was one which never yielded more than half the crop of the well-known 'Up-to-Date.' On the other hand, the old favourite, 'Magnum Bonum,' was not only relatively immune for a great number of years, but was also very productive and of fair table quality.

The lecturer had not referred to the Wart Disease (*Synchytrium endobioticum*). This, up to the present, has only appeared in certain districts of the country, but the number of outbreaks is increasing year by year, and when the disease does appear it is far more destructive than *Phytophthora*; not only are the tubers rendered absolutely

useless, but successive crops of the same potato on the same land are certain to be attacked, and it is impossible to grow varieties of potato which are liable to this disease for several years without the certainty of their being attacked. Fortunately, however, there are several varieties of potato which are absolutely immune to the Wart Disease, and these are the only sorts which the Board of Agriculture allow to be planted on land which has once been affected by the Wart Disease.

Nothing perhaps is more interesting or remarkable in the experience of potato-growers than the striking immunity of such sorts as 'Langworthy,' 'Sutton's Supreme,' 'Conquest,' 'Abundance,' 'What's Wanted,' 'White City,' and 'Great Scot' to the attacks of *Synchytrium endobioticum*.

Mr. G. MASSEE pointed out that the effect of different minerals or fertilizing substances as affecting the relative susceptibility of plants to injury by fungi was not a new idea. As a boy on his father's farm he learned from others that the use of nitrate of soda favoured the development of rust on cereals, more especially barley.

He drew attention to the following points in relation to diseases of plants caused by fungi :—

Fungi in general are to-day credited with doing much more harm to plants than they do in reality. Apart from the rusts, smuts and mildews, it is an open question as to how many fungi are the *primary* cause of disease, but given a chance due to some previous weakness on the part of the host-plant, such fungi can gain a foothold and work havoc, and as such havoc is obvious the fungus is too frequently considered as the *primary* and sole cause of injury, whereas but for some previous weakness the said fungus could not have attacked the plant. In such cases fighting the fungus does not strike at the root of the matter, and good results cannot be attained, as everyday experience abundantly proves.

The favourite occupation of working out the so-called life history or cytology of a fungus, although valuable in proportion to its accuracy, does not indicate the primary cause of disease, which in the majority of cases—except in the rusts, smuts, and mildews—is a physiological problem, a problem invariably shirked, probably on account of the difficulties it embodies. There must be a definite reason why certain plants remain immune when every chance of infection is present. To select and breed from such immune specimens is a rule-of-thumb method. The "why" is the question to be settled once for all, so as to give the clue. A better knowledge of plant physiology appears to be the only hope for elucidating the matter, and should be forwarded at all costs. Plant pathology, so far as fungi are concerned, can only state, with more or less accuracy, the fungus present, and suggest means for preventing its spread.

He had no doubt that immune plants can be produced in any given place if sufficient attention is given to the subject, but common experience has proved that such plants, when cultivated at a distance

from their place of origin, lose their immune properties, and in many instances are exceptionally susceptible to disease under such conditions. Marked instances of this condition of things are found in the varieties of wheat immune, as grown in Australia, but, when imported into the United States, found highly susceptible to the disease to which it was immune at home. The same experience followed the introduction of immune Indian cowpeas to the United States. Such instances could be multiplied almost indefinitely, and appear to suggest that immunity appears in some way to be influenced by the conditions under which it was produced, food, climatic conditions, &c. Again, in attempting to produce immune forms, the idea appears to be that of modifying the plant in such manner that its fungus parasite is unable to attack it, forgetting or ignoring the fact that a fungus is as capable of modifying its mode of attack as its host-plant is of repelling it. I have demonstrated that fungi known only as saprophytes can be educated to become rampant parasites, so much so that they can no longer live as saprophytes, but, by reversing the process, can be brought back again to a saprophytic condition. Others have done the same, and, knowing the adaptability of fungi generally, I would back fungus to win against any process of immunity that can be acquired by higher plants, granted time and opportunity.

In replying, the LECTURER pointed out the difficulty of obtaining sufficiently critical evidence to deal with these views. That a rapid change on the part of the fungus was likely seemed to be negatived by historical evidence, for the oldest known wheat in cultivation, 'Einkorn,' was characterized by an extraordinary degree of immunity, not merely to our common rust, but to two others as well. Yet these parasites had presumably had the opportunity of changing their habits from the time the second town of Troy was built up to the present. The question of the failure of a variety known to be disease-resistant in one locality when transferred to another required careful consideration before it was assumed that the failure was due to any change in its power of resistance to disease. The question of failure was largely an economic one, and if the variety in question did not succeed as well as those already established in the new locality it naturally went out of cultivation. Such was the case with FARRER'S Wheat 'Bobs' in South Africa: it simply proved unsuitable for the new climatic conditions. That the failure was not due to any changed disease-resistance was shown by the fact that POLE EVANS used this variety as a parent plant in his cross-breeding experiments, owing to its immunity to the very rust for which FARRER claimed it possessed a great power of resistance in Australia.

The lecturer did not think inferior strains were more disease-resistant than those of good quality. That it was a rare character combined with the many that go to make superiority was readily intelligible. A more definite answer could be given only after attempting to combine disease-resistance with "quality."

THE COCO-NUT PALM (*COCOS NUCIFERA*, LINN.)

By Sir Everard im Thurn, K.C.M.G., C.B.

(Read May 14, 1913: Field-Marshal Lord Grenfell, G.C.B., G.C.M.G., in the Chair.

By word of mouth and by help of certain pictures which I have accumulated during a long life spent in various lands where the coco-nut palm is often the main feature in the landscape, I propose to tell you enough of the appearance, the history, and the uses of the coco-nut palm to leave you with a clear idea of what this tree is like.

The nut-bearing coco-nut palm (*Cocos nucifera*) is not cultivated for ornamental purposes in European hothouses; for, unlike the many palms so used—and unlike many species even of its own genus—this palm is not beautiful when young—or perhaps ever, at least until it reaches an old and very large state. It is one of the half-dozen most important and most interesting of tropical plants; yet, though it is almost impossible to find a book on life or travel in the tropics which is without some mention of this palm, or to take up a newspaper which in any way deals with commerce and the markets without coming across some reference to the nuts, I very much doubt if there are many people who have passed their lives in temperate climates who have any idea what the tree looks like or even know anything of the nut, except perhaps that it is or was set up at country fairs to be knocked down by the lucky ones at a penny a shy, and perhaps that nowadays it enters into the composition of margarine and consequently of "butter."

First of all I should like to say something of the name by which this tropical nut has become known to all people of Western origin. It is a curious little study in word origins

The nut seems to have been first heard of in Europe from travellers in the East Indies—where, however, the palm was probably not originally native; and till nearly the end of the fifteenth century the fruit seems always to have been referred to simply as "the Indian nut." It must here be remembered that up to that time the great usefulness of the fruit was not recognized even in the East Indies, and that the Pacific Ocean—which it can hardly be doubted was the original home of this useful species of the genus *Cocos*—had not then been discovered. Consequently the nut was then known only as a more or less interesting curiosity. The earliest use of another name seems to have been in 1498 or 1499 by the Portuguese traveller Vasco da Gama, who, obviously on account of the now very well-known monkey-faced appearance of the nut when deprived of its thick enveloping husk, applied to it the Portuguese (and Spanish) word *coco*, which means "a grin," "a grimace," or a "face" (as in the phrase "he made a

face") ; and this name *coco* (plural *cocoes*) caught on and was adopted generally by English and other European writers. Next, when Dr. JOHNSON'S dictionary was being printed, by mistake the article on what JOHNSON himself elsewhere habitually wrote of as "coco" or "cocoes" (*i.e.* the old "Indian nut") was, evidently by some careless editor, run together with the article on that very different tropical product which, by an adaptation of its native Mexican name *cacaoatl*, was called "cocoa" (or more properly "cacao"). From that time till quite recently the form "cocoa-nut" has been used almost universally even by educated people ; but I confess I was rather troubled in mind when I found I was advertised to speak to you to-day of cocoa-nuts instead of coco-nuts.

It may be added that it was apparently in order to avoid confusion between the two similarly-named commercial products that the palm-fruit was long known in London commercial circles, and consequently at country fairs, as "koker-nuts" or simply "kokers."

An old friend of mine, towards the end of a long life, most of which was spent in the tropics, used to complain of the long straight rows of coco-nut trees which, with the huge rectangular blocks of sugar-canes, made most of the scenery in a land where, whether the air was dry or saturated with moisture, it was always hot ; he said that the palms reminded him of worn-out stable mops standing on end.

The coco-nut—like most other palms—is essentially of very simple form, almost as simple as the toy tree of a Noah's ark. It consists, normally, of an unbranched stem, rather shapeless and even gouty-looking, from the top of which spring the comparatively few but large leaves and the comparatively small spikes which carry the flowers and fruit. The youngest post-impressionist artist should have no difficulty in setting down on paper something recognizable as such a typical palm. As a matter of fact, the draughtsmen who accompanied the earlier travellers through lands where the coco-nut flourished generally contented themselves with indicating the palms which they saw in this simple sort of way, as may be seen in the drawings of Captain SAMUEL WALLIS, who, with Captain COOK, was one of the earliest, at the end of the eighteenth century, to investigate the Pacific islands ; and the drawings which, about fifty years later, Captain BEECHEY, of H.M.S. *Blossom*, brought back are hardly better in their representation of the distinctive character of the coco-nut palm.

It took much closer observation than these earlier travellers could give to detect the details of form and arrangement of parts sufficiently to enable an artist to set down on paper lines which suggest anything like the real aspect of a palm, and how the general aspect of one palm differs from that of another. As a matter of fact the minute differences are innumerable, and often very difficult to detect even by the man with the most experienced eye ; yet it is perhaps possible briefly to indicate enough of these to make plain—at any rate with the help of pictures—what a coco-nut palm is like, and wherein

it differs in general appearance from other palms. Briefly, the really telling differences are to be found chiefly in the form of the trunk, in the curve of the midrib of the leaf, in the way in which the leaflets are set on the midrib, and in the curve of these leaflets.

I cannot better sum up the characteristic appearance of the coco-nut palm than in the words of Dr. ALFRED RUSSEL WALLACE, written many years ago (1853), after his travels with BATES on the Amazon. In his book on "The Palms of the Amazon" (in which, by the way, the verbal descriptions are, to my mind, much better than *from an artistic point of view* are the drawings) he wrote of the coco-nut palm: "The leaves are large, terminal, and regularly pinnate. The leaflets are rigid, and spread out very flat on each side of the midrib. . . . Its peculiar characteristic is the rigidity of its leaves, which curve or droop very slightly, and the leaflets spread out with remarkable flatness and rigidity . . . the whole tree has not that light and feathery appearance which it is often represented as possessing."

The normal appearance of this palm, in its adult state, is as in figure 129 taken on the beach in Fanning Island, a lonely little coral atoll far away in the north central Pacific.

Abnormal growth seems to be rare in palms generally, and, if I may judge from my own rather wide experience, is perhaps especially rare in the coco-nut. I have, however, come across a few very curious variations, of which I can show you the following pictures. The first is of a tree growing in the garden of Government House in Fiji (fig. 125). In this the peculiarity will at once be noticed that the leaflets separate very imperfectly from each other and from the midrib. The natives declare that it is a different kind of coco-nut—by which they certainly mean that it is, in their opinion, a distinct and fixed species. For myself, I am uncertain about this; I am assured that the variety reproduces itself truly from seed, but, on the other hand, the manner of growth is suspiciously like that which, for instance in the Solomon Island plantations, is known to be produced by the attack of a beetle.

Before I went into the Pacific I had never seen—I doubt if I had ever heard of—a coco-nut tree with anything but a straight and simple stem. But in Fiji I have seen trees with branched stems, doubtless as the result of injury. I am able to show you the picture of one which has divided into three (fig. 126), and of another divided into seven (fig. 127).

The ordinarily single stem of the coco-nut is—unlike those of most other tall-growing palms—rarely quite straight; but very occasionally, of course as the result of abnormal conditions, it assumes extraordinarily twisted forms.

The fruit of the coco-nut, at any rate in its adult and transported state, is too well known to need any description here. Here in England it is generally seen deprived of its thick fibrous covering.

The flower-spike, wrapped in its hard woody sheath, starts from the top of the trunk, just where the lower leaves, *i.e.* the oldest, leaves start. The flower-spike is originally erect, or almost so, but when the

small flowers have turned into fruits and these begin to swell to the comparatively enormous size which they eventually attain, the ever-increasing weight forces the spike to bend downward, till the mature bunch of fruit—often weighing much more than a man can conveniently lift—hangs down below the leaves.

It may be as well here to say that there are many varieties of coco-nut, *i.e. Cocos nucifera*, under cultivation in different parts of the world, differing from each other very greatly in size and colour. Botanists refuse to recognize any specific differences between these, and they are probably right from their point of view, for all these variations are probably the result of long cultivation—or rather of long and probably partly unintentional selection. But for practical purposes one cannot overlook the difference in size between, say, the huge nut of Rotumah—which even without its husk is as large as an average man's head—and the little "drinking-nut" which is grown in the Friendly Islands for the express purpose of quenching the thirst of the chiefs and nobles. This latter is so small that a section cut from the centre of the nut serves as a very convenient napkin ring.

Where the coco-nut palm—by which I mean all the varieties which can without doubt be included in that useful class—originated, and what has been the history of its distribution, in greater or less abundance, throughout almost all the sea-coasts of the tropics, are matters quite uncertain. It is not known, at least with any certainty, as a wild species anywhere. Probably the most widely accepted story now is that it originated at some point on the western side of Central America. Briefly stated, the reasons for this belief are that by far the greater number of the same genus *Cocos*—over seventy in number—are tropical American; that though the coco-nut is now naturalized practically everywhere on the shores of tropical seas it has almost certainly been longer and more thoroughly established in the islands of the Pacific than elsewhere; that it is next best established in the Indian Ocean, especially in the Maldives and Ceylon; and that though present it appears to be least well and least long on the eastern side of America and in Africa—of all tropical areas. And, lastly, the great ocean currents of the Pacific are just such as would account for the natural distribution of the coco-nut from some point on the west coast of tropical America to the places, as has just been said, where the tree now appears most at home.

It seems to me that there can be little doubt that the coco-nut was originally distributed—at any rate through the Pacific—mainly naturally, *i.e.* by the floating of the large, buoyant, and thoroughly water-proofed nut, with husk on, along the great ocean currents. The poet LONGFELLOW has vividly described another kind of flotsam as

"Ever drifting, drifting, drifting
On the shifting
Currents of the restless main;
Till in sheltered coves and reaches
Of sandy beaches
All have found repose again."

That well describes the almost world-wide distribution of the innumerable coco-nuts which, from times beyond the memory of man, must have been carried on the shifting currents of the ocean into the most distant parts of the world, many of them soon finding congenial resting and growing places on the sandy coral rocks of tropical seas, but some few floating on further and further till at last a nut or two occasionally reached even to the cold and ungenial European shore, there to be picked up by the wondering inhabitants and esteemed so strange and marvellous that these "nuts of India" were cunningly mounted with gold or silver for use as cups at the most splendid of royal feasts, and later found place in the cabinets of the curious.

The coco-nut is certainly most at home—and is most necessary to the life of the natives—in the islands of the South Seas, in that wonderful group of innumerable islands, mostly very small, which reaches out two-thirds of the way across from the Australian to the American shore, and is right in the track of the great currents and in the teeth of the mighty winds which sweep mainly from east to west across the Pacific Ocean. On to the once bare rocky edges of these islands and atolls (fig. 128), many a coco-nut must have drifted, taken root and grown; and in time countless numbers of these fringed every shore, and crowned every island and islet and outstanding rock (fig. 129). The most characteristic of all these islands are the coral atolls which at some comparatively recent date have been lifted out of the ocean—"strange rings of coral rock rising from the bottom of the sea." Whenever these were raised they must, of course, have been at first bare of vegetation. Even now one occasionally comes across one, the bare rocks of which are not yet softened by any plant life, and more often one comes across others on which as yet hardly anything but the coco-nut and perhaps the screw-pine have yet found foothold.

There is still many an island in the South Seas the natives of which—if indeed there are any permanent inhabitants—have no food supply except fish from the sea and the produce of the coco-nut palm and screw-pine; and it is really on the coco-nut that they are almost solely dependent. At times, and for considerable periods when no rain has fallen to refill the hollows in the rocks, these natives have nothing but the "water" out of the young coco-nuts with which to quench their thirst.

Nor is it only for food and drink that the native is, or was, chiefly dependent on this all-useful palm. He habitually uses the various parts of the tree for all sorts of purposes. If he wants to fence off his fish-ponds he does it with great masses of dead coco-nut leaves weighted down with stones (Fanning Island and in some parts of Fiji). He often builds his house of coco-nut leaves. If he wants to dance he makes his special dress for that purpose of the same material. Of it he makes, or used to make, mat sails for his boats. He makes all the string or rope which he needs for innumerable purposes from the fibre of the husk of the nut; for instance, he fastens together even

FIG. 124.—COCO-NUT PALMS AT ONGTONG, JAVA.

[*To face p. 328.*

FIG. 125.—A PECULIAR FORM OF COCO-NUT PALM.

FIG. 126.—MANY-HEADED COCO-NUT PALM.

[*Photo: N. Chalmers.*

FIG. 127.—MANY-HEADED COCO-NUT PALM, SUVA.

the most elaborate of his houses with this string, and uses not a single nail in the whole edifice. If he wants to make a ceremonial gift it cannot take more magnificent form than a great ball of the finest coco-nut string.

I have hitherto spoken of the uses made of coco-nut palms by Pacific islanders; and time fails to tell much of other uses made in other parts of the world. But there are just two points in connexion with Ceylon which I should like to mention.

There one of the chief uses, by natives, of the coco-nut palm is the extraction of toddy from the young flower-spikes, which to-day, when fermented, becomes arrack.

In Ceylon the more artistic native turns the young coco-nut leaf to marvellous decorative use. At the time of the coronation of King Edward the natives built a large and really beautiful pavilion practically entirely of these young leaves (fig. 130).

To return to the uses made of the coco-nut in the Pacific islands: hitherto I have confined myself chiefly to the uses by natives and for their own purposes, but even of such uses have hitherto failed to mention one of the most important.

Long before the advent of Europeans to those parts oil was doubtless extracted by the natives from the nuts; and this oil, generally after being heavily scented with sandal-wood, was used by them for anointing their hair and bodies. When Europeans first arrived in the islands they came to get sandal-wood and any other marketable merchandise which they could lay hands on. They had to content themselves for the most part with pearl shell, *bêche-de-mer*, and other raw produce of the sea. But gradually it was found that there was one thing which the natives produced primarily for their own use, but which could be profitably exported; and this was coco-nut oil. The captains of the whalers and other ships which called at the islands in early times almost always tried to get a few casks of coco-nut oil from the native chiefs. A little later the Wesleyan missionaries established themselves in the islands, and they soon found that the readiest means to collect money, or rather money's worth, from the converted natives, for the support of the mission, was in the form of coco-nut oil. Hence a regular practice of collecting this oil for other than their own uses was started by the natives.

Still later, when Europeans had more firmly established themselves in the islands, it was recognized that the extracted oil in casks or barrels was a difficult thing to handle. The new plan of cutting out the "meat" of the coco-nut, drying it, and exporting it in the form of "copra"—the oil from which was afterwards expressed by suitable mills—was adopted. Thus was started the trade in copra which has now reached such huge dimensions.

TROPICAL AND SUBTROPICAL FRUITS IN CALIFORNIA.

By F. W. Popenoe, F.R.H.S., Altadena, California, U.S.A.

California has been known for many years for its oranges and lemons, its prunes and apricots, and many other fruits which it grows on an extensive scale. The last quarter of a century, however, has witnessed a great increase of interest in the cultivation of other exotic fruits, especially those of a tropical or subtropical nature. Several of comparatively recent introduction are already taking a position among the commercial products of the State ; others, while perhaps marketed in a small way, are grown more for the interest they possess, and to increase the variety of fruits placed upon the home table.

One of the most remarkable features of California is its wide diversity of climatic conditions, embracing comparatively humid, frost-free localities near the sea-coast, arid but frost-free locations in the foothill regions several miles back from the ocean, and interior valleys whose climatic conditions are little different from those of the Sahara, as well as the cooler portions of the State where the temperate fruits are grown to perfection, and mountain slopes where Conifers flourish up to the point of perpetual snow. Obviously, such a range permits the cultivation of nearly all fruits except the most delicate of the equatorial belt, the absence of uniformly high temperatures throughout the year prohibiting the successful cultivation of such species as the durian, mangosteen, and rambutan. And while our horticulturists have been somewhat slow in following up their advantage, they are at last awakening to a realization of their strategic position, and pushing forward in all directions.

Every quarter of the globe has been laid under contribution to furnish its most interesting and valuable fruits to California. Many of these introductions have not yet passed beyond the experimental stage, having been too recently imported to have produced fruit yet or to have fully proved their adaptability to our climate and soil, but they, nevertheless, show promise of eventually becoming valuable additions to our economic flora. The following species, for many of which we are indebted to Dr. F. Franceschi of Santa Barbara, whose twenty years' work of introduction and acclimatization has added many beautiful and valuable plants to Californian gardens, are some of the most interesting of this class :

Achras Sapota Linn., *Antidesma Bunius* Spreng., *Britoa acida* Berg, *Byrsonima crassifolia* H. B. & K., *Calodendrum capensis* Thunb., *Castanospermum australe* A. Cunn. & Fraser, *Clausena Wampi* Oliver, *Coccoloba caracasana* Meissn., *Crataegus mexicana* Moc. & Sesse, *Cupania sapida* Voigt (properly *Blighia sapida* Kön.), *Eugenia alba*

Roxb. (properly *E. javanica* Lam.), *E. brasiliensis* Lam., *E. cauliflora* Berg, *E. costaricensis* Berg, *E. edulis* Vell., *E. littoralis* Planch., *E. Luma* Berg (properly *E. apiculata* DC.), *E. Mato* Griseb., *E. pungens* Berg, *E. pyriformis* Cambess., *E. Uvalha* Cambess., *Ficus Pseudo-Carica* Miq., *Flacourtia Ramontchi* L'Hérit., *Greigia sphacelata* Regel, *Lucuma mammosa* Gaertn., *Malpighia mexicana* A. Juss., *Melicocca bijuga* Linn., *Myrtus Arayan* H. B. & K., *Nephelium Lit-chi* Cambess., *N. Longana* Cambess., *Passiflora ligularis* A. Juss., *Psidium cuneifolium* Tenore, *P. Friedrichsthalianum* Niedenzu, *P. laurifolium* Berg, *P. littorale* Raddi, *P. montanum* Sw., *Rollinia emarginata* Schlecht., *R. orthopetala* A. DC., *Strychnos spinosa* Lam., *Vangueria edulis* Vahl (properly *V. madagascariensis* J. F. Gmel.), *V. infausta* Burch., *Vitellaria multiflora* Radlk. (properly *Lucuma multiflora* A. DC.), *Xylosma Salzmanni* Eichl.

Leaving these out of consideration, the following list describes the actual situation with regard to those which have become so well established as to be offered by the trade :—

The Avocado (*Persea gratissima* Gaertn.).

During the last few years the Avocado has attracted so much attention in California that it is rapidly assuming a position of importance among commercial fruits. Although introduced about 1870, it was scarcely known until after 1900, and only seedlings were grown until four years ago. Since it does not come true to variety when grown from seed, it was recognized that cultivation on a commercial scale would only be made possible through vegetative propagation. Budded trees are now being produced, and many have been planted.

The exact area in which the Avocado can be grown has not yet been determined, but it has been found to do well in the Citrus belt and coastal regions of the southern part of the State. Since its success elsewhere depends largely upon obtaining hardier and more drought-resistant types, a definite search has been made for such types in Mexico, with the result that varieties have been secured that will, without doubt, greatly extend the area in which the fruit can be profitably grown.

Most of the trees now in bearing are of Mexican or Guatemalan origin. The type from Guatemala (fig. 131) appears to be the most desirable for commercial purposes, on account of its thick, woody skin, which permits the fruit to be shipped to distant markets. The smaller, thin-skinned type from Mexico (fig. 133), considered a distinct species, *P. drymifolia* Cham. & Schlecht., by some botanists, is not so valuable commercially, but is a favourite for home use. Of both these types there are numerous named varieties, some of the most prominent being 'Taft,' 'Lyon,' 'Murrieta,' and 'Chappelow.'

Propagation by shield budding is somewhat more difficult than with Citrus fruits, probably because it is not, as yet, so well understood, but several nurserymen are producing budded trees in large numbers. Grafting, when done under glass, is also successful and is

practised to a limited extent. Seedling stocks are ready for budding at the age of six or seven months, when grown under favourable conditions, and are worked in spring or summer.

Avocados command fancy prices in the markets, single fruits fetching as high as $1.25 in the winter season, although the average price for a good specimen, about a pound in weight, is 50 or 60 cents. The two types bear at different times of the year, and this, with the variation in season of the different varieties, permits the fruit to be in market for about ten out of the twelve months.

The Cherimoya (*Anona Cherimolia* Mill.).

Although introduced at about the same time as the Avocado, the Cherimoya (figs. 132, 135) has not yet become commercially popular. This can only be attributed to the fact that propagation by seed has resulted in a large majority of the trees being inferior or worthless. Several small seedling orchards have been planted and later grubbed out because the trees did not produce enough fruit to make their culture profitable. Budding is now being practised, and prolific and otherwise desirable varieties are being planted. The cool climate of the coastal regions of southern California seems to be especially suited to this fruit.

As yet only two named varieties are known ; of one, the ' Golden Russet,' a small plantation of budded trees is now in bearing. There is no disputing the fact that the Cherimoya, in its finer varieties, is one of the most delicious of all fruits, consequently the future of Cherimoya culture, now that propagation by budding has placed it on a sound basis, looks very bright.

The Date (*Phoenix dactylifera* Linn.).

Experiments carried out by the Department of Agriculture and by various private growers have demonstrated that the date palm is admirably adapted to the Imperial and Coachella valleys, in the southern end of the State, where climatic conditions are practically those of the Sahara. Palms have been in bearing for some years, and through the importation of offshoots and planting of seedlings an industry is being rapidly developed. Nearly 25,000 offshoots have been imported, about 9000 having come from the Persian Gulf region and the remainder from North Africa. Varieties from practically all the principal date-growing regions of the world have been planted experimentally, and an accurate idea gained as to their adaptability. The ' Manakhîr ' from Tunis, ' Deglet Nur ' from Algeria (fig. 136), and ' Maktum,' ' Khustawi,' and ' Khadrawi ' from Mesopotamia have proved to be among the best.

The Mango (*Mangifera indica* Linn.).

The progress of the Mango (fig. 137) in this State has been retarded by the planting of worthless seedlings, and by neglect of many of the trees. In a few localities fruits of good size and flavour have been

produced, demonstrating, at least, that Mango culture is not an impossibility here. Locations in the foothill regions, which experience a high degree of heat throughout the summer, have proved to be best suited to the Mango, the climate along the coast being too cool during the summer to ripen the fruit perfectly.

The Department of Agriculture is now conducting co-operative experiments in several localities thought to be suited to Mango culture, about forty varieties being on trial. Many of these were introduced from Saharanpur, Bombay, and other sections of India famous for their Mangos, and are the best Indian varieties.

The Loquat (*Eriobotrya japonica* Lindl.).

The Loquat has been grown in this State for forty years, with considerable attention recently given to its improvement. Seven or eight named varieties are now offered by the trade. The climate in some parts of the State seems particularly suited to it, and the fruit develops to large size.

Loquat culture is most prominent in Orange county, the largest single plantation being about forty acres in extent. Early in the season the fruit sells at 10 to 15 cents a pound, and many tons are marketed each year.

Propagation is by budding, seedling Loquats being generally used as stocks. When budded on quince the trees are dwarfed.

The best varieties of local origin are 'Advance,' 'Premier,' and 'Champagne.' A variety introduced from Japan some years ago under the name of 'Giant,' but seemingly synonymous with 'Tanaka,' is later in ripening than the local varieties, but of large size and excellent quality.

The Guavas (genus *Psidium*).

The only species at all common is *P. Cattleianum* Sabine, which goes under the name of Strawberry Guava, and is found in backyards and gardens throughout the southern part of the State. The fruit is a favourite for jelly-making, and is widely sold in the markets. A yellow-fruited form of this species, *P. lucidum* of horticulture, is much less common, but fully as valuable.

P. Guajava Linn., of which there are here, as elsewhere, a number of more or less distinct varieties, is not infrequently seen, and is hardy enough to be successfully grown in many localities. It is difficult to explain why it has not become more popular, since the fruit is preferable for jelly-making to that of the Strawberry Guava.

Several other species are occasionally seen. One somewhat similar in general appearance to *P. Cattleianum* was introduced from Florida under the name of *P. Araça* Raddi, and is likely to become popular, as the fruit is of good size and flavour. Another species introduced from Florida is listed as *P. guineense* Sw., but it is certainly not this species, and is so similar in every characteristic to *P. Guajava* that it can probably be referred to a horticultural form of that species.

The White Sapote (*Casimiroa edulis* La Llave).

This was the first tropical fruit planted in California, having been introduced by the early Mexican settlers (fig. 138). It has never become very popular, and is not commonly cultivated, the greatest drawback being that seedling trees require nine or ten years to come into bearing, and are even then very uncertain as to the size and quality of fruit they will produce. Attempts at asexual propagation are now being made, in order to perpetuate choice varieties originated as chance seedlings. So far only seedlings have fruited, and it is not known that any of their fruit has ever been placed on the market.

The Feijoa, or Pineapple Guava (*Feijoa Sellowiana* Berg).

Although recently introduced, the Feijoa (fig. 134) is already widely planted and is becoming more popular every year. Its hardiness permits it to be grown almost anywhere in California, although it does not seem to thrive in the extremely hot interior valleys.

Most of the plants now growing in the State have been propagated from seed, but to perpetuate choice forms it is necessary to resort to vegetative propagation. Cuttings are not difficult to root, and grafting is successful; layering is the easiest method, but is too slow ever to be popular.

Three named varieties have been established, of which the best is probably the 'André,' the plants grown here having been propagated from the specimen in the garden of the late Edouard André, at Golfe-Juan, on the Riviera.

The Rose Apple (*Eugenia Jambos* Linn.).

This species has proved to be quite hardy in southern California, but is planted more for its ornamental value than for its fruit. There is much difference among the plants, some producing larger, more highly coloured and highly perfumed fruits than others, perhaps due in some measure, but not entirely, to the care bestowed upon them.

E. uniflora Linn. (*E. Michelii* Lam.), another member of the genus of economic value, is not up to the present time a success as a fruiting plant. Although it is apparently at home in this climate, the plants produce too sparingly to be of any value. The same appears to be true of *E. Jambolana* Lam.

The Jujube (*Zizyphus sativa* Gaertn.).

For the interior arid valleys the Jujube is proving of value, and, through the introduction of the choice Asiatic forms recently secured by the Department of Agriculture, it seems likely to become of real importance. Practically all those which have been grown up to the present time are inferior seedlings.

The Passion Fruit (*Passiflora edulis* Sims).

The abundance of better fruits with which Californians are supplied has prevented the passion fruit from becoming popular. It is hardy, and not infrequently seen in gardens, but the fruit is rarely used.

The Natal Plum (*Carissa grandiflora* A. DC.).

This shrub bears too sparsely to make it of economic importance, but its ornamental value has stimulated planting to such an extent that it is occasionally seen in gardens and collections of exotics. There seems to be considerable variation among the different plants in regard to productiveness as well as size of fruit, and taking advantage of this it should be possible to secure, through asexual propagation, varieties that will be worthy of general cultivation.

The Pomegranate (*Punica Granatum* Linn.).

The Pomegranate is produced commercially in a small way, the demand for the fruit being limited. The shrub succeeds best, and is most commonly grown, in the interior valleys. The inferiority of the varieties cultivated in the State has led to an attempt to secure superior ones; among those which have been introduced the variety 'Wonderful' has proved to be choice, and is now offered by the trade.

The Japanese Persimmon (*Diospyros Kaki* Linn.).

This fruit is becoming quite popular, and is proving correspondingly remunerative to the growers. The varieties most extensively grown are 'Tane Nashi' and 'Hachiya.' From one grove of six acres over 15 tons of fruit were picked last season, which sold at 10 to 12 cents a pound.

The Pineapple (*Ananas sativus* Schult.).

At several different times attempts have been made to grow pineapples commercially in southern California, but these have always resulted unsuccessfully, since an excessive amount of care and expense was required in the production of the fruit, and it could not be sold at a profitable figure in competition with the imported product.

Pineapples require more heat than is found on the sea-coast to develop to large size and perfect maturity, consequently they are more successfully grown in the foothill regions some miles back from the ocean. 'Red Spanish' and 'Smooth Cayenne' are about the only varieties cultivated, and these are rare.

The Tree Tomato (*Cyphomandra betacea* Sendt.).

This plant is occasionally seen in gardens, but the fruit is usually allowed to fall to the ground and go to waste. Its easy culture has made it more widely planted than would otherwise have been the case, but as a fruit it is in no likelihood of becoming very popular.

The Kei Apple (*Aberia caffra* Harv. & Sond.).

As grown in California this is a fruit of little value, and in addition bears very sparsely except in rare instances. It has proved to be quite hardy, and seems to be of considerable value as a hedge plant, but its cultivation is not being extended very rapidly.

The Papaya (*Carica Papaya* Linn.).

The Papaya is one of the tropical fruits which Californians seem most anxious to grow, and many seedlings are annually planted. Most of these succumb during the cold rains of winter, but in favoured locations, with well-drained soil, the plants sometimes reach maturity and bear fruit. Old plants exist at Hollywood which bear regularly, but the summers are not hot enough in this locality to mature the fruit perfectly. Further inland, in locations practically free from frost, better success is attained. The whole subject, however, is in an experimental stage as yet.

The Kaffir Plum (*Harpephyllum caffrum* Bern. ex Krauss).

This South African tree, introduced about eight years ago, is chiefly valuable as an ornament. Although it has fruited in several localities, it does not produce regularly or abundantly, and the fruit itself is of little value. It seems hardy enough for ordinary locations, and has been planted to a small extent as a street tree.

The Ceriman (*Monstera deliciosa* Liebm.).

Fairly common as an ornamental plant in ferneries and pergolas, its fruit does not ordinarily ripen sufficiently to be eatable, although it is freely produced and attains good size.

The Banana (*Musa sapientum* Linn.).

In favoured locations in southern California good bananas have been produced, one grower at Santa Barbara even going so far as to cultivate a small commercial plantation for several years. The banana is one of the commonest ornamental plants to be seen in dooryards and gardens but in ordinary locations the fruit does not ripen perfectly and is of no value. In addition, the varieties cultivated are practically all inferior ones.

The Chinese Raisin (*Hovenia dulcis* Thunb.).

Although usually listed as a fruit, this species as grown in California has no economic value whatever, and, although offered by several nurserymen, is rarely planted.

The Queensland Nut (*Macadamia ternifolia* F. v. M.).

The drought-resisting qualities of this tree make it of value for semi-arid regions, while its ornamental appearance commends it for culture in every garden. While very few trees are yet in bearing in the State, several thousand young plants have been disseminated by the nurserymen within the last few years, and the tree promises to become popular, not only for the home garden or orchard, but commercially as well.

FIG. 128.—SURF BREAKING ON THE WEATHER SIDE OF FANNING ISLAND.

FIG. 129.—COCO-NUTS ABOVE STRAND, NEAR ENGLISH HARBOUR, FANNING ISLAND.

[*To face p.* 336

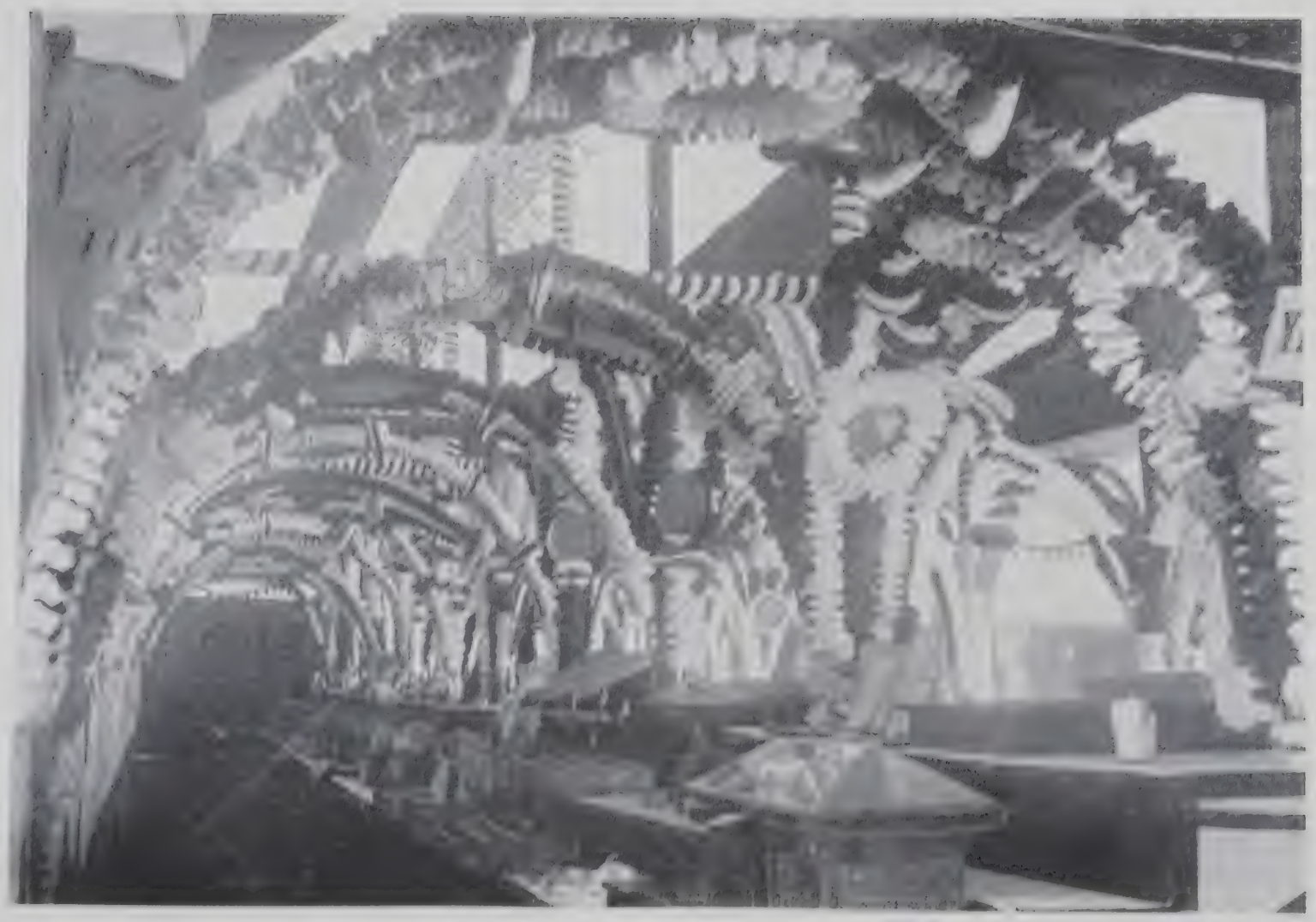

Fig. 130—Lycas Exhibition, 1961-1962

FIG. 133.—FRUITS AND FOLIAGE OF THE MEXICAN TYPE OF AVOCADO.

FIG. 134.—FRUITS AND FOLIAGE OF [illegible]

Fig. 135.—Cholollola Tree, hitting years old, at Hollywood, California.

Fig. 136.—Peppers on "Double Nut" Date in Hedge, California.

Fig. 157.—Young Mango Tree in fruiting at Los Angeles, California.

FIG. 138.—A WHITE SAPOTE AT SANTA BARBARA, PROBABLY THE FIRST EXOTIC TREE PLANTED IN CALIFORNIA.

The Carob (*Ceratonia siliqua* Linn.).

The Carob is grown here almost exclusively as an ornamental tree, the inferiority of the local varieties, as well as the abundance of better fruits, preventing it from becoming of any economic value. While not common, it is rather frequently seen in gardens, and is sometimes used as a street tree.

The Melon Shrub (*Solanum muricatum* Ait.).

This is one of those fruits whose chief recommendation is the ease of its culture. Some profess a liking for the fruit, but as a general rule the plant is grown as a curiosity and the fruit is allowed to rot on the ground. It is rarely seen in Californian gardens.

THE EVOLUTION OF PLANTS, AND THE DIRECTIVITY OF LIFE, AS SHOWN BY VEGETATIVE STRUCTURES.

By Rev. Professor G. HENSLOW, M.A., F.L.S., V.M.H.

[Read June 17, 1913; Sir F. W. MOORE, F.L.S., in the Chair.]

Introduction.—My last lecture * was on "The Origin of Life—Undiscoverable." We can only deal with life so far as we know it. I endeavoured to show that all theories of the origin of life were inadequate; and one reason was because they left out of consideration the fact that life is something over and above all kinds of physical force, and that, in the process of making vegetable and animal structures, life guides or directs inanimate forces so that they compel the similarly inanimate matter to build up cells, tissues, and organs in a purposeful manner.

We group the various organs of plants under two heads, the Vegetative and Reproductive (proper). The former embrace the roots, stems and branches, leaves and stipules. The latter are the flowers and fruits. The floral organs are the bracts, sepals (calyx), petals (corolla), stamens, and carpels (pistil). Each and all of these organs are variable, *i.e.* can change their forms provided the necessary external conditions of life are present.

As long as a plant lives generation after generation under precisely the same conditions, no change is likely to occur; but when seeds get transported to some markedly different locality, then, as they germinate, they begin (if it be necessary) to change their structures in *response* to the changed environment. The change may be slight—as in a greater or lesser degree of hairiness—or profound, especially in the internal structures, as in changing from a land to a submerged life, and *vice versa* (as has occurred in the water-crowfoot). The "response" may bring about no "benefit" to the plant, as in the case of drought, which prevents branches and leaves being fully formed, so that they get reduced to spines, a common feature of tropical "thorn forests," savannahs, deserts, heaths, &c. On the other hand, the changes generally involve *uses*, without which the plant could not live; as in developing a cuticle and breathing stomata, on what had been submerged leaves without either structure. Hence we may say generally that "purposeful adaptations" are the result of changed conditions in the environment, such being ultimately the effect of the "Directivity of Life."

I now propose giving illustrations of such changes in each of the several organs of plants.

Roots.—Roots have three principal functions, viz. to supply water and dissolved salts; they may act as reservoirs of water and

* See p. 39.

plant food; and they act as supports to the aerial part of the plant. The forms of roots, more or less characteristic of species and varieties, are not very numerous; the commonest is long and cylindrical, such as, *e.g.*, the wild form of the carrot, turnip, radish, and parsnip, or generally the tap or primary root of a dicotyledonous embryo. Under cultivation in a wet and rich soil, it has varied to a conical form in the carrot and parsnip; into a spindle-shaped and globular one in the radish and beet and in the rape and turnip respectively.* These forms raised under cultivation are hereditary in ordinary garden soils; but they at once revert to the wild form if they be grown in a fine, sandy soil. The globular type was produced by sowing the seed in a stiff soil, which presumably prevents the downward penetration of the tap-root.

The cause of the change of form is the new conditions of life provided in cultivation. The plant is stimulated by much nourishment to make larger leaves; these then do more work, making more starch and sugar than is required for annual growth; hence it has to be stored up, so the root enlarges to receive it. This "vegetative" function being prolonged delays the process of reproduction by flowers and seeds until it is too late in the season. The plant thus becomes a biennial; being provided with plenty of water, the leaves become nearly or quite hairless. These garden forms are obviously thus the result of response to the changed conditions of life.

Peculiar forms with changed internal cellular structures are found in many herbs and trees growing in marshy districts. Some trees, as the deciduous cypress (*Taxodium distichum*), not infrequently cultivated, have roots more or less hollow, which rise above the swamp, erect, or as "knees," whereby the roots get aerated. One of these trees near the Thames, in the gardens of Sion House, has numerous "pneumatophores" (air-carriers); but a fine tree in the garden of the Grand Hotel, Lyndhurst, in the dry sandy soil of the New Forest, has none at all.

Our little marsh-samphire (*Salicornia herbacea*), common in salt-marshes, has its roots clothed with a spongy coating which provides the plant with air in a similar way.

On the other hand, some plants† growing in the deserts have knotty swellings on the roots which store up water against the dry season.

Clasping roots have been acquired to enable many plants of various families to climb up walls, tree-trunks, &c., as our own ivy, members of the Aroid family in tropical rain forests, epiphytic orchids, and many others, showing the general property of adapting the roots to other purposes than that of providing water and salts as in all ordinary plants.

Tap-roots are always arrested in aquatic dicotyledons and all monocotyledons, which have undoubtedly descended from the former. Consequently their roots must arise from the base of the stem in ascending series from the nodes; the stem, increasing in size, becomes

* The rape and turnip are varieties of the same species, *Brassica campestris*.
† *E.g.* species of *Erodium*, or Stork's-bill, in the desert near Cairo.

conical with the *apex* resting in the earth. The herb or tree (*e.g. Pandanus* and Palms) is then supported by stilt- or prop-roots. They are usually cylindrical; but in some tropical trees, having a very long trunk and a heavy mass of foliage at the top, as has the mahogany, or in short trees similarly with great weight, the roots form flat buttresses. Such are imitated in a small way by engineers, who put "gussets" at the base of iron pillars, to strengthen them. Many are like "flying buttresses."

All the cases here mentioned, whatever be their uses, are the results of adaptation to the conditions of life. They are, moreover, characteristic of the species, genus, and, not infrequently, of the order to which they belong.

Stems.—The external forms of stems vary very much, but they are always the consequence of responding to the conditions of life, as anyone may observe for himself. Thus short, thick trunks with a heavy mass of foliage are characteristic of, say, the horse-chestnut and oaks; while tall, straight stems are seen in pines. The former type indicates a greater freedom of growth, while the latter, by growing thickly, are "drawn." These characteristics have become hereditary, but special varietal forms, as the "fastigiate" and "weeping," may be only feebly hereditary. Thus seedlings of the weeping ash show a tendency at first to "weep," but become erect afterwards, as experiments have shown. The weeping willow retains this habit by water, but several planted in the dry St. John's Wood Cemetery, London, exhibited no such tendency.

The "weeping" habit appears thus to be attributable to moisture in the soil or air; for the Deodar Cedar, when growing in its native home on the Himalaya Mountains, resembles the Cedar of Lebanon, but in England the habit has become drooping, though the Cedar of Lebanon has retained the stiff character of the branches.

Some trees of warm climates have enlarged bottle-shaped trunks. The wood-fibres have delicate cell-walls, hence called "cork-wood" (*Ochroma lagopus*), for their function is to store water.

Experiments have shown that ordinary woody stems grown in very dry air, in very wet air, and under normal conditions differ very appreciably in the comparative amounts of wood, pith, and cortex, the wood being greatest in the driest conditions and the cellular tissues greatest in the moist ones.

The comparative uselessness of the wood of poplars and willows is due to their responsive growth in a watery soil.

The general necessity of wood in trees is of course to support their own weight: in other words, to resist the everlasting pull of gravity downwards. This has become hereditary, because seedlings of trees and shrubs develop a strong cylinder of wood at once when only two or three inches in height—a quite unnecessary proceeding, as may be seen by comparing it with any herbaceous plant, say the flower-stalk of a cowslip, in which only a discontinuous circle of vascular bundles is formed, being quite sufficient for purposes of support.

In a previous lecture on the senses of plants I showed how woody stems respond to strain tensions, &c., and build up mechanical structures to meet them. All such can become hereditary.

Underground stems assume various forms, as tubers, corms, rhizomes, creeping stems, &c. They are all adaptations for either storing water, starch or other food supplies, or else for propagation; generally both purposes are combined.

As a rule the special forms are constant in each species of plant respectively, but now and then nature changes them or does not develop them when the place happens to be very moist. Such is the case with the grass, *Poa bulbosa*, which has swollen internodes for holding water; similarly *Ranunculus bulbosus* fails to produce the characteristic "corm" when it grows in wet and peaty soil.* The leek is naturally a bulbous plant, as in the dry limestone soil of Malta, where it is wild, but under cultivation the bulb is not retained, though it is so in other kinds of onion (genus *Allium*). It occasionally will reproduce the bulb. Bulbs are very characteristic of certain families of monocotyledons, as the Daffodil, the Iris, and Lily families. The reason appears to be that, as *all* monocotyledonous plants are descended from aquatic dicotyledons, when adapting themselves to a land situation they adopted water-storage methods to enable them to live through the dry seasons.

Long, subterranean, creeping stems of species of grasses and sedges occur in sand-dunes. If a shoot of hop or mint, &c., be buried, it will continue to grow for some distance and then reappear above ground. The portion buried will be found to have taken on all the characters of a rhizome.

Similarly epiphytic orchids, which attach themselves to branches of trees in tropical forests, by means of clasping or adhesive roots, though the forest may be always wet below, the epiphytic orchids are dry near to the tree-tops, so they induce their internodes to swell into "pseudo-bulbs" having a very tough rind; but the interior consists of a mass of delicate cells filled with water.

Woody-stemmed shrublets of the deserts, as near Cairo, fill their cortex, or pith, &c., with water, so as to withstand the dry and hot summer months.

A result of response is often "degeneracy"—that is to say, organs no longer required are supplanted by others; the former then cease to be formed or are only feebly represented. Thus aquatic stems need no "wood," as the water supports them, the vascular bundles degenerate, the formative "cambium" nearly or quite disappears. Such is the case with all aquatic and all monocotyledonous plants. In the latter the wood does not form close-fitting concentric cylinders as in all timber trees, as there is no cambium layer wherewith to form them. Hence palms cannot increase beyond a certain amount, radially. The power to do so is lost originally by response to an aquatic life.

* A peaty field by Poole harbour abounds with it; but, instead of flowering in May, it does not do so till August and September.

Another acquired habit is that of climbing by means of the stem. It has often been observed that some genera of plants may have non-climbing species in the open, but climbing ones in shaded places, the climbing habit having been acquired by the seedling being "drawn" when germinating in a dark forest or wood. Then the elongated stem, by circumnutating, cannot help coiling up some neighbouring stem. If a bean or some non-climber with a slender stem, as a periwinkle, be grown in total darkness, and a fine stick be placed close to it, as the stem elongates it will coil spirally around it. This habit can become hereditary. With regard to tendrils, they may be metamorphosed leaves, as in peas, or flowering branches, as in the vine and Passion flower. In the Virginia creeper there are superadded adhesive pads, which are only developed on contact with the wall, to which the hooked tips of the branches of the tendril become attached. In this species of *Ampelopsis* they are never formed previously to contact; they *are* in the Japanese species, but they are not effective till *after* contact.

A member of the Cucumber family (*Trichosanthes*), only known to climb by tendrils which clasp, happened to press its tendrils against the wall of a frame. It at once began to form pads, thus proving its capacity to direct adaptation to a new condition in a new way.

An ordinary climber may cease to climb if it have nothing to climb up, and assume a creeping habit, as our common bindweed, which will frequently clothe a bank, just as *Convolvulus Soldanella* spreads over the sand of our sea-shores, but never climbs like the other species of that genus.

Leaves.—We are all familiar with the diversity of the forms of leaves; but they are the result of adaptations to the conditions of life. We may roughly divide leaf-blades into broad and narrow. The former are such as can be spread out, so as to be at right angles to incident light; the narrow ones, as of grass, are the result of growing thickly together, so that they get pretty equally illuminated on both sides, the anatomical structures corresponding, whereas in horizontal leaves the upper and under sides are quite different. Some few plants twist their leaf-stalks—apparently for strength—when the characters of the two sides now become reversed.

Leaves growing in rather deep water are sword- or grass-like, as those of the Arrow-head. This is due to light falling vertically upon them as on grass in a meadow, as they grow erect under water.

It is not until the blades can float or rise out of it that they become broad, as in pondweeds and the Arrow-head. The complete identity of form and anatomy between such aquatic and land monocotyledons with those of aquatic dicotyledons proves the descent of the former from the latter, the entire structure being adaptation to an aquatic life, though in terrestrial monocotyledons there have been readaptations to the new conditions, without their losing the older aquatic structures to some extent

Very rapid changes in adaptation are easily seen in the water

crowfoot. The submerged leaves are divided up into thread-like segments. This is the result of response to the water, but if the seed be sown in a garden the plants grow to maturity, retaining the aquatic form, but adopting the anatomical structure for an aerial existence.

The preceding are but a few typical illustrations of response to changed conditions of life. It is not too much to say that every structure, every cell, is really formed with its own definite purpose, carried out by the act of response, under the Directivity of Life.

The blades can become degenerate, as in leaf-scales on underground stems, but are useful in bulbs, as storage-organs.

Similarly, they are more or less useless as small bracts, but can acquire uses, as when they are brightly coloured or are subfoliaceous. But we are here passing on to the reproductive organs, which will be the subject of the next lecture.

TUBEROUS BEGONIAS.

By CHAS. F. LANGDON, F.R.H.S.

[Read Aug. 26, 1913; Mr. W. A. BILNEY, J.P., in the Chair.]

THE early history of the tuberous Begonia has been so fully and so well dealt with by Sir HARRY VEITCH and the late Mr. JOHN LAING at the Begonia Conference held at Chiswick in 1892, and recorded in the R.H.S. JOURNAL vol. XV., that it will not be necessary to dwell upon it, and as my first acquaintance with these plants did not commence until the year 1885, and then with only a limited collection, I cannot add anything to the remarks then made by the illustrious horticulturists before-mentioned. I should like, however, to repeat the opening remarks of Sir H. VEITCH. He says: "In the whole range of subjects which horticulturists have taken in hand with a view of effecting their improvement and their better adaptation for decorative purposes, there is not one, I think, which stands forth more prominently at the present time than the Begonia." These remarks are as true to-day as they were in 1892; the twenty years that have intervened have only served to accentuate their truth, for great as was the transformation effected by those early hybridists, I think that all will agree that the advances made since have been equally great.

My experience with Begonias dates from the year 1885. Since then I have spent almost the whole of my time in cross-fertilizing and raising them, the first seventeen years with the Rev. EDWIN LASCELLES, of Newton-St.-Loe, and since 1901 as partner in the firm of Messrs. BLACKMORE and LANGDON.

It was the year after I had taken up the duties of gardener at Newton-St.-Loe that Messrs. J. LAING sent out their Royal set of single Begonias, and being already in possession of a small collection, including such varieties as 'Vesuvius,' 'Acme,' and others, Mr. LASCELLES, who was a most enthusiastic amateur, procured the new set and thus possessed a quite up-to-date collection of single varieties.

The following year, 1887, Messrs. LAING sent out their Jubilee set of doubles, conspicuous among them being 'Mrs. A. Adcock,' *alba fimbriata*, 'Prince of Wales' and 'Lady Lennox.' These created quite a sensation. The set included practically all the colours then known, and with a number of varieties of Continental origin which Mr. LASCELLES procured, among them being 'Mme. Arnoult,' 'Gabriel Legros,' 'Clémence Denizart,' 'Mme. Comesse,' 'Mme. Crousse,' and 'Mme. de Dumast,' we had ample material to commence work at cross-fertilization.

Having been fairly successful with a batch of about a thousand

single seedlings, we were ambitious to raise some doubles and began intercrossing the Continental varieties and those of English origin. Our first efforts were very successful, and we obtained about half a dozen varieties that we considered to be distinct advances on the other varieties of the same colours in our possession.

Our enthusiasm in the work being now thoroughly kindled, Mr. LASCELLES procured all the new varieties likely to be of any use either at home or on the Continent. Messrs. CANNELL had at this time commenced sending out a batch of new varieties annually, and these we found to possess characteristics differing very widely from those of Messrs. LAING and the Continental varieties, suggesting to us the possibility that a different group of plants was being used as parents. Messrs. CANNELL'S varieties possessed a stiff habit, round thick leaves and strong flower stems, one of the best examples being the 'Hon. Mrs. Plunkett,' the growth and habit partaking rather of the character of *Begonia rosaeflora* and *B. Veitchii*. The varieties sent out by Messrs. LAING, on the contrary, were of a much more drooping habit and with long pointed leaves, showing that *B. boliviensis* had been the dominant factor in their origin. Others of Messrs. LAING'S hybrids had evidently been obtained from *B. Davisii*, a good example being the 'Marquis of Stafford,' a very valuable variety for bedding on account of its neat upright habit and bright crimson flowers, borne well above the foliage.

The advantage of having the best examples from three sources, viz. Messrs. LAING, Messrs. CANNELL, and from the Continent, will be apparent when we consider that the first essential in cross-fertilization is to possess a number of varieties, each with some desirable character, but all obtained from more or less distinct sources. This has doubtless contributed largely to the measure of success which I have obtained in the improvement of the Begonia. As my experience points to the fact that inbreeding is bad, and should be avoided as much as possible, I have depended almost entirely on first crosses, and have not worked at all on what are known as Mendelian lines.

I have always kept in view, when crossing, the desirability of obtaining two varieties whose colours and habit of growth were somewhat similar, but as far removed as possible in relationship from one another. This necessitates keeping a pedigree book and having a considerable number of stock parents, forming several different families in each group of colours. It is not advisable to make violent crosses, such as crossing yellow with pink or rose, or crimson with white. The best results are obtained from work within well-defined lines by intercrossing only such colours as rose, pink, blush, and salmon in one group, crimson, scarlet, and red in another, and orange and yellow in another. Whilst working generally within these lines I should deprecate a slavish adherence to them, as occasions will arise for making experimental crosses, and these are full of interest, though more often than not very disappointing.

It will be readily understood, as I depend on first crosses, how much I welcome a good variety of any colour from another raiser; every such variety obtained opens up a very large field of work, increases the possibility of new breaks, and further lengthens the line of progress. Of course every new introduction has to be very critically examined and used very carefully at first, or the work of years may be undone.

It will now be interesting to compare some of the double varieties existing twenty-five years ago with the more recent introductions. This will help us to appreciate the advances made in the form, size, and colour of the flowers. It will be observed that in the old varieties the petals were small and the flowers did not conform to any particular shape, whilst the varieties of the present day will equal in form the choicest Roses and Camellias, and are larger in size and far more varied in colour than either.

This great alteration has been brought about by a very gradual process of careful fertilization and the raising annually of a great many thousands of seedlings, rigidly selected when in bloom. Hundreds of varieties have been named, each of which has been the selection from thousands, only to be superseded in a more or less short time by others of higher quality.

One of the chief charms of the double Begonia is its great diversity of form, and whilst resembling many other flowers, such as the Camellia, Rose, Hollyhock, and Carnation, there are many intermediate types which cannot be said to resemble either.

I trust this diversity of form will always be retained, and that future raisers will not endeavour to work for any one type to the exclusion of the others.

In the year 1892, when the Begonia Conference was held, mention was made of but two sections of tuberous Begonias, viz. single and double. Now, however, we have two distinct new forms of singles, the frilled and the crested (called by the Continental growers 'Crispa' and 'Cristata'). These are both of Continental origin and are valuable classes, the frilled especially so. They are to be obtained in all colours common to Begonias, and in many the colours are blended beautifully. The combinations of white and pink, and yellow and salmon, have a charming effect. The pure white frilled Begonia often closely resembles a glorified Chinese Primula. The crested varieties are to my mind more curious than pretty. The flowers are single, with a conspicuous crest on the face of each of the four sepals. This crest is often more highly coloured than the sepals, giving a curious and often very pretty effect.

We have lately added another section which we call basket Begonias, because of their being specially well adapted to this style of cultivation. They are all doubles, and their habit of growth, long pointed leaves, pretty pointed sepals and petals suggest *B. boliviensis* as being their progenitor, rather than any other species. They are splendid subjects for the embellishment of the conservatory or any

greenhouse that is lofty enough to permit of their being suspended from the roof over the pathways. Having begun with the varieties 'Alice Manning,' 'Marie Bouchet,' and 'Fleur de Chrysanthème,' we have now a good collection with a wide range of colours. The later varieties are remarkable for their cactus-like form and wonderful freedom of flowering. They are becoming increasingly popular, their graceful habit appealing to many who do not care for the large-flowered double and single varieties. Examples of these are 'Gladys,' 'Fleur de Chrysanthème,' 'Rose Cactus,' 'Golden Shower,' and 'Lena.'

Improvement in the ordinary single Begonia is seen in the flowers being larger, rounder, and of better substance than was obtained formerly. They make handsome plants for the conservatory, but it is in the open flower garden that they excel. For large masses of colour in almost every shade except blue, they are pre-eminent. There is a danger that, in striving to get large flowers, raisers will at the same time get increased size in the leaves. It is possible to get flowers as much as eight inches in diameter, and these are much sought after for exhibition purposes, but an ideal single Begonia for bedding is one of between four and five inches in diameter, borne on erect stems and freely produced on a plant of free branching habit. To get all these qualities combined in single Begonias of all colours will provide work for raisers for many years to come.

Begonias are much used as bedding plants, and they richly deserve their popularity. I fully anticipate a much greater popularity for them when the qualities of our strains of upright-habited double varieties become known. There is an impression among gardeners that single Begonias are better than doubles for bedding because the doubles are so heavy; they will not hold their flowers up. This was quite true when the doubles had such long thin stems that the flowers were on the ground, but it is not true to-day, because now we have doubles whose flowers are more or less erect, and many quite erect, and these, having much greater lasting qualities than singles, give a much richer effect. Our beds of double seedlings have the appearance of masses of very dwarf roses, except that the flowers are so much larger and in so much greater profusion. Seedling tubers of double varieties can now be obtained of excellent quality for bedding, and in all shades of colour ranging from pure white to deep crimson.

To get plants of an even growth and habit and exactly alike in colour, it is necessary to resort to propagation by cuttings. There are a number of named varieties that have been propagated in this way, and some of them are excellent. 'Lafayette' is an old favourite and is a very useful variety, especially for small beds. 'Argus' is a larger variety, bright scarlet, very stiff and upright in habit. 'Hilda' is of a rich salmon shade with lighter centre; the flowers are of good size, and are thrown well above the foliage. It is one of the most beautiful. 'Marquis of Stafford' is old, but still one of the b[illegible] of

the small-flowered varieties. It is crimson in colour, free-flowering and very neat in habit. Other good varieties are 'Gladiateur,' crimson; 'Lord Langton,' bright scarlet; 'Major Hope,' light rose; and 'President Savoye,' pale yellow.

Time will not permit me to give full details of the cultivation of Begonias, and as the method of raising from seed is generally understood, I will confine my remarks to the growing of plants from tubers for conservatory decoration and for exhibition. They can be had in bloom at any time from the middle of May until the end of October, the tubers for May flowering being started in January, and later batches according to the time it is desired to have them in bloom. The best results are obtained from those started early in March. These can be grown without much artificial heat, and much better results can be obtained if the tubers start quietly and naturally than when they are forced. A temperature of 60 degrees to 65 degrees is warm enough. Boxes about three inches in depth should be used in which to start them. These should be well drained by placing a layer of crocks over the bottom, covering these with half-decayed leaves. The soil should be light and porous, consisting of loam and leaf-mould in equal parts, with a half part of sand. The tubers should be buried to the level of the crown, and will require very little water until they have started. It is a good plan to cover the boxes with some sheets of brown paper. This will prevent evaporation and there will be less danger of the tubers rotting through being over-watered. When they are well started, they can be put into pots according to their size, allowing about an inch of room around each. The soil for this potting should be good fibrous loam three parts, leaf-mould two parts, well-decayed manure one part, with sufficient coarse sand to keep the compost open. Press the soil moderately firmly about the tuber, which when finished should be just buried in the soil. Keep the plants now as near the glass as possible, and in a nice light house with a temperature of about 60°. Give plenty of atmospheric moisture and plenty of ventilation; on bright days a light sprinkling with the syringe will be beneficial.

These conditions should be continued until the plants are in bloom, when the syringing should be stopped. Begonias should be shaded from bright sunshine when grown under glass; and for this purpose movable blinds made of No. 5 garden netting are the best I have seen; but if this is not easily obtainable a light shading should be painted on the glass. They will be ready for their final shift when the roots are found to be running round the sides of the pots and before they get anything like pot-bound; it is better to shift them too soon than to let them become pot-bound.

The soil for this, the final shift, may be a little richer, and should consist of a similar compost to that used before, using rather less leaf-mould and adding a 4-inch potful of Clay's Fertilizer, or other good artificial compound, to each three bushels of soil. The compost should not be too fine, and on no account should it be sifted. Do not

over-pot the plants. Most double varieties will do well in 6, 7, or 8-inch pots unless the tubers are large. If, later on in the year, the plants appear to have outgrown their pots, they can be given a shift with great advantage at any time during the summer, even if they are in bloom, and the blooming period of the plants will be greatly prolonged. Singles require more pot room than doubles, and some of them will fill an 8 or 9-inch pot well. Watering must be well attended to from the beginning, and especially the first three weeks after repotting. The plants will be benefited by an application of manure water once a week when the pots are getting full of roots and they are beginning to bloom. They are gross feeders, but it is better to give them liquid manure often and not too strong. Soot water is good for them and should be given alternately with some good animal manure. It is important to remove all buds until the plants are well established and the pots are fairly well filled with roots. All side buds should be removed from the doubles at as early a stage as possible. This will increase the size of the flowers and there will be less tendency for them to droop.

Seedling tubers, one year old, or early cutting tubers of the previous year, give the finest flowers, but for specimen plants two or three-year-old tubers would be most suitable.

It is not a common practice to propagate single Begonias by cuttings, as they are obtained so easily from seed, but this method of propagating is indispensable for the named double varieties. Cuttings are taken at any time during the summer, either of the shoots that spring directly from the tuber, or of the side shoots; but in either case care must be taken that there is a dormant eye at the base of the shoot, immediately beneath which it must be severed or the cutting will not form a tuber. The cuttings will strike readily if placed in a propagating frame and kept close. They are best inserted at the sides of the pots in a compost made up of equal parts of loam, leaf-mould, and sand. They will make root in about a month, when they should be gradually exposed to light and air. The young plants will be greatly benefited by a shift into 3 or 4-inch pots, using soil similar to that recommended for tubers.

Tuberous Begonias are subject to attacks of green fly, Begonia mite, and eel-worm. Green fly can be easily kept under by the ordinary methods of fumigation. The Begonia mite is the most insidious foe the grower has to fear. Its presence is detected only when irreparable damage has been done to the plants. It is then recognizable by the brownish appearance of the under sides of the young leaves and the points of the shoots, which gradually turn black, wither, and die. The growth of the plants is completely stopped, and they are quite spoiled for the season. (*For many years this was treated as a fungoid disease.*) Plants that are found to be affected should be immediately isolated and sprayed with a strong insecticide. The remainder of the plants should be vaporized with nicotine compound, three times in succession. However, prevention is better

than cure, and to keep this enemy at bay the following precautions should be taken: The Begonia houses must be kept scrupulously clean. The stages and walls should be thoroughly cleansed and washed during the winter months with a powerful insecticide, and every particle of loose soil should be taken away. The tubers also may be dipped into a good insecticide before starting into growth. If these precautions are taken and the plants grown sturdily without much artificial heat, the mite can be kept under, and this, the most frequent source of disappointment to the grower, will cease to trouble him. Eel-worm is also very troublesome in some districts. Its presence is easily detected by the leaves showing dark patches usually near the outside edges, the older leaves being attacked first. These dark patches gradually get larger, the tissue of the leaf is quite destroyed, and the leaf falls off. There is no known means of curing the plants when once attacked. The usual way of treating soil for eel-worm is to sterilize it by steaming or baking, but the method we practise is to add a 4-inch potful of newly-slaked lime to each eight bushels of soil, well mixing it a few days before using. The lime has a very beneficial effect on the soil if used in moderation, and we find it to be a complete preventive of eel-worm. A rather greater quantity than I have mentioned may be used without any bad effects on the plants, and it may be advisable to use more on soils that are suspected of being badly infested.

The cultivation of the Begonia is greatly simplified if these much-dreaded pests are kept under. The care of a large collection, whilst very interesting, is also very exacting work. During the twenty-seven years I have been working amongst them I have had many anxious days, but these have been more than compensated for by the amount of pleasure I have derived from them. That a fair amount of success has attended my efforts has been shown by the Awards given to our firm by the R.H.S. during the eleven years of its existence.

HINTS ON HERBACEOUS BORDERS.

By George Bunyard, V.M.H.

In order to condense my subject into the limits of a short paper, it will be needful to exclude alpine and rock plants, although many of them can be properly placed in the front rows of herbaceous borders.

Preparation.—The first consideration is the preparation of the border, or its renovation and rearrangement if already existing.

In making a new station, mark out the intended area—a border 9 feet wide is best—making use of an existing background, such as a shrubbery, wall, hedge, or fence; but if these do not exist hedges may be formed of any desired evergreen, such as Yew, Holly, Laurel, or, for cheapness, the oval-leaved Privet, but a 3-ft. path or grass verge should be left between the hedge and the border, otherwise the roots of the former will rob the herbaceous plants and interfere with their perfect development. The border should then be trenched 2 feet deep, adding as the work proceeds some well-rotted manure with leaf soil and sand for heavy land, and cow-dung with kainit for lighter soils. The ground should be roughly turned up on the surface for the air and frost to act upon it, and, if possible, some old potting or burnt soil may be usefully incorporated. It will not be needful to take out all the porous stones, as they retain moisture and tend to keep the soil open; but flints should be removed, as they do not absorb water.

In the rearrangement of borders all the existing plants should be first taken out, laying them in handy for re-planting. The ground should then be trenched and enriched as previously advised. It is better that the front of the border should not be quite straight.

Planting.—If the border is 9 feet wide, the back row, 3 feet from the outside, should have tall plants set out at 6 feet apart (if space allows) or 4 feet if the area is restricted; and in this row a good appearance is ensured if a few beautiful flowering shrubs and ornamental foliage are introduced—such as Lilacs, *Spiraea ariaefolia*, *Philadelphus grandiflorus*, *Cerasus Veitchii*, *Pyrus spectabilis*, Crab 'John Downie,' *Cotoneaster pannosa*, gold or silver Japanese Maples, and Bamboos of the most graceful tall kinds, such as *aurea*, *anceps*, *nigra*, or *viridi-glaucescens*, and a clump of the tall Reed, *Arundo Donax*. The use of such plants as these is a matter of taste, and other plants may be added to give character and flower at a time when the herbaceous plants are not in flower, such as the white *Cytisus albus*, the yellow Spanish Broom (*Spartium junceum*), and the showy *Cytisus Andreanus*, with *Buddleia Veitchiana*, *Berberis stenophylla*, or any flowering shrubs of upright growth. Some introduce a few Bush Roses, such as the

Moss, Cabbage, 'Cottage Maid,' Austrian Yellow and Copper, and in large borders the Rugosa Roses and their hybrids are very effective. The varieties, 'Mrs. Waterer,' 'Parfum d'Hay,' 'Mme. Lucien Villemot,' are three good crimsons, and the single white variety, the double white 'Blanc double de Coubert,' 'Conrad F. Meyer,' and the pretty pale blush *fimbriata*, are recommended.

Again, in large, wide borders a few pillar Roses at 20 feet apart are striking, such as 'Lady Waterlow,' 'Tausendschön,' 'Hiawatha,' climbing 'Caroline Testout,' climbing 'W. J. Grant,' 'Excelsa,' 'Paradise,' 'Blush Rambler,' climbing 'Capt. Christy,' 'Gruss an Teplitz,' 'Leuchstern,' 'Rosette de la Légion d'Honneur,' 'Aimée Vibert,' 'Trier,' 'Mme. Alfred Carrière,' and 'Sweetheart' are good whites. Climbing 'La France,' and 'Ards Pillar' and 'Ards Rover' (two grand crimsons) are not out of place. The roaming Roses are rather too rampant.

Should it be desired to omit some of the shrubs mentioned, alternative plants would be:

*3. *Eremurus Elwesii.*	21. *Spiraea Aruncus acuminata.*
7. *Onopordon bracteatum.*	25. *Campanula lactiflora alba.*
11. *Lupinus arboreus.*	29. *Cephalaria alpina* (cream).
17. *Senecio Veitchianus.*	33. *Lychnis chalcedonica flore pleno.*

There is a craze, which I have not seen successfully carried out, to have borders all blue, or graduated from white to pink, to golden, to bronze, and up to crimson, but in my opinion a mixed border blooming over a long period is far preferable.

Taking then a back row of herbaceous plants only, I have indicated on the plan (p. 359) where a shrub may be introduced, if required, by a star, but it would not spoil the arrangement if omitted.

It will be readily understood that such a plan is open to criticism or rearrangement, but it is compiled after careful thought, and many really good things may have been omitted because the choice of subjects is so extensive and tastes differ.

As I have suggested, the front edge should be scalloped and thus form suitable positions for the very dwarf growers, and, if preferred, a continuous line of white Pinks, *Gentiana acaulis*, purple Thrift, Aubrietias, &c., may be used to finish off the front row or rows; or many dwarf kinds may be used in patches of three or five each.

Planting Time.—September and October are suitable months for planting if the soil of the border is light and friable, but in heavier land it is safer to prepare the border and plant in March or April, as winter frosts mellow the surface and enable the soil to be more closely and firmly pressed round the roots and collars of the plants. In planting it is very important that the lower roots—often more fleshy than fibred—should be put down full length, and not be curled round to fit the hole prepared for them, as it is upon these main roots that the plants rely to withstand the spring or summer drought.

* These numbers refer to the position on the plan (p. 359).

When autumn planting is adopted the border should be gone over in March to settle down any plants that may have been lifted by frost in winter, after which the border should be raked over neatly.

If at the spring planting the weather should prove dry, start the plants by giving them a watering just before finishing the planting, and if after watering some loose soil is raked round the plants it will check evaporation and keep the soil moist for a long period. Some subjects, such as Pyrethrums and Pentstemons, should be planted only in the spring.

Presuming the borders are now planted, the next operation is the thinning out of superfluous shoots in May. This particularly refers to such plants as Phloxes, Michaelmas Daisies (Asters), *Helianthus*, and Delphiniums. First cut out the thin and weakly shoots, and leave three or five only of the strongest and most promising—and at this time search for snails and slugs, which are very fond of Delphiniums—and sprinkle some lime or soot around them to check their depredations. As the shoots grow it will be needful to secure the growths, and for this purpose some green wooden sticks, or bamboos coloured green, should be used, the shoots being loosely attached with bast to allow for growth. For the back row they would need to be five feet long—one foot underground and four feet above—in order that when the shoots grow and develop they may be hidden by the spread of growth above them; for the next row 3½ feet, then 2½ feet, and there will be many in the fourth front row that can stand alone.

The neglect of staking at an early stage renders the plants liable to be broken off, or to have their growths twisted and distorted so as to spoil them for the season. In staking, practically each stem should have a stick and the points should bend outward. Thus an Aster with five shoots should have the sticks within a 1-foot circle at the base, and from 2 to 2½ feet at their free ends: in this manner air circulates between the stems, and the full beauty of each plant will be displayed. Such subjects as Eremuri will require a stout stake to each spike, while Tritomas (Kniphofias) can do without sticks. *Phlomis* bear massive spikes and must be staked. If the first sticks placed prove to be too short owing to free growth, such as takes place in a wet season, longer sticks may be attached without removing the old ones.

It is often urged against herbaceous borders that, although as a whole they give a display over a long period, some plants get shabby after flowering and thus have to be cut down, leaving ugly blanks. This can be remedied by growing on in pots Canterbury Bells, *Campanula pyramidalis* (6 feet), Sweet Williams, Blue and Red Salvias, Castor-oil plants, tall Antirrhinums, Lobelia 'Queen Victoria,' standard Fuchsias, Streptosolen, Heliotropes, Marguerites for back rows, choice Pentstemons, Lilies, and Dahlias, which can be used to fill vacancies by planting near the faded plants; but Delphiniums, if, as soon as the blooms fade, they are cut back to 6 inches from the soil, saving

all possible foliage, will generally bloom again in autumn, and it strengthens the stools of many plants to cut them back before seed pods form.

In November the glory of the border will have passed, and the remaining stalks can be cut down and the border tidied for the winter, taking care to leave all evergreen foliage ; and in the case of a spring-planted border it will be well to liven up the early appearance by planting Daffodils, Scillas, Hyacinths, and other bulbs for spring display, at any time before Christmas.

During the summer and autumn notes should be taken of any clashing of colours or mistakes in grouping that the taste of the owner objects to, in order to remedy faults by removals and replantings for the next year's display.

A border as suggested will stand for two or three years, after which the soil may become exhausted. The plants should then be lifted, and the border manured after taking out some of the old soil and bringing in some fresh fibrous loam. If the border cannot be renewed, it is a good plan to refresh the large clumps of Asters, *Helianthus*, *Phlox*, &c., by spading out the centres of the stools (making a triangular cut), filling in the hole made with fresh soil, as in these and like plants the best growths will be found on the outer edges of the clumps.

In large gardens entire beds of one family, such as Iris, Asters, Phloxes, and Delphiniums, are very striking, and the Asters (Michaelmas Daisies) lend themselves admirably to this arrangement, as they now embrace a great range of colour and the Amellus section are grand for front rows. Delphiniums; of course, look rather flat after they have blossomed and are cut back, but they might be alternated with other plants, such as the Japanese Anemones—the pale pinks and whites of this family would harmonize with the autumn blue spikes of the Delphiniums, and the Anemones are very pleasing. Again, in a Phlox border every alternate plant might be a Pyrethrum ; their blooms would be past before the Phlox blossom, and their green fern-like foliage would form a good setting for the bright colours of the Phlox. With the Iris, whose foliage after the flowering season is over is always striking and bold, Lilies such as the easily grown *tigrinum*, *pomponium*, *candidum*, and *Thunbergianum*, can be utilized, with here and there a clump of the Double White *Gypsophila paniculata*. Other combinations could be made for borders of Paeonies, with Gladiolus and Lilies, or Montbretias, or bold beds of the Giant Poppies (*Papaver bracteatum* and *P. orientale*). With these some bold-foliaged plants, such as *Acanthus*, *Angelica*, and *Senecio Veitchianus*, should be introduced. Poppies are apt to lose all their leaves in summer, but they come fresh and green again in autumn.

A word as to Paeonies. These are often starved in borders when mixed with other plants, and are therefore best planted 4 feet apart on ground trenched 2 feet deep, using soil made very rich with manure, sand, and leaf soil. After planting, mulch the surface with half-rotten dung, and fork in just under the surface about March without

at all disturbing the roots ; then, when the growth is 1 foot tall, sprinkle on the surface 2 oz. to the yard of nitrate of soda, and hoe it in around the plants, and they will give you grand blooms when established. When the stems carry more than 2 buds, thin them out, and for exhibition only leave the best (one) bud and stake them so that the blossoms do not fall over with their weight. Paeony foliage remains till autumn and often assumes brilliant colours ; between the plants the smaller growing Asters (Michaelmas Daisies) could be planted with effect. The single Paeonies need not be disbudded, and when secured the sticks should not be visible.

A list of the very best and newest varieties in each section may be of service to those whose borders need refreshing. The prevailing colours are given, and readers who are often puzzled by perusing catalogues may rely on getting good results from this selection.

Asters (Michaelmas Daisies).

Large-flowered.

'Beauty of Colwall'	Pale blue, double	3 feet
'Climax'	Pale slate blue	5 ,,
'Esther'	Delicate pink	2 ,,
'Daisy Peters'	White	3 ,,
'Mrs. Day'	Rosy pink. Early	4 ,,
'Mrs. S. T. Wright'	Rosy blue	4 ,,
'Norah Peters'	Creamy white	4 ,,
'R. Parker'	Lavender blue. Early	4 ,,
'Lil Fardell'	Carmine red	4 ,,
novae-angliae pulchellus	Violet	5 ,,
'Mrs. Rayner'	Magenta	4 ,,
'Saturne'	Rich blue	5 ,,
'St. Egwyn'	Bright pink	3 ,,
'Thirza'	Soft mauve	5 ,,
'Top Sawyer'	Blue	5 ,,
'White Queen'	Starry	4 ,,

Small-flowered, Feathery Growth.

'Amity'	White	2 feet
'Approval'	White. Late	6 ,,
cordifolius albulus	Pale heliotrope	3 ,,
cordifolius 'Ophir'	Pale mauve	3 ,,
cordifolius 'Photograph'	Rich lilac	3 ,,
cordifolius 'Ideal'	Lavender	4 ,,
'Coquette'	Pink shaded	3½ ,,
'Daydream'	White	4 ,,
'Debonair'	White	6 ,,
'Hon. Vicary Gibbs'	Pink	3 ,,
'Harmony'	Pale rose	3½ ,,
paucifolius	Starry white. Late	4 ,,

'Symphony'	Pale mauve	4 feet
turbinellus	Lavender	4 ,,
turbinellus elegans albus	White, starry	3 ,,
Tradescanti	White. Drooping. Late	3 ,,

In the Amellus dwarf section, the best are:

'Beauté parfaite.' 'Perry's Pink.'
'Cactus.' 'Perle Rose.'
'Blue Stone.' 'Preciosa.'
'Distinction.' 'Onward.'

These are rich shades of violet and slate blue.

Delphiniums.†

* 'Alake'	Splendid violet	Tall
* 'Bassanio'	Ultramarine, white eye	,,
* 'Belladonna flore pleno'	Azure	Dwarf
'Cappadocia'	Creamy white	3 feet
* 'Coriolanus'	Peacock blue	4 ,,
* 'Cymbeline'	Violet, white eye	4 ,,
'Capri'	Silvery blue, elegant growth	3 ,,
* 'Daniel'	Slate blue and white	3 ,,
* 'Hermia'	Nemophila, blue	3 ,,
* 'Hypatia'	Topaz and bronze	3 ,,
'Hamlet'	Bronzy violet	4 ,,
* 'Jessica'	Azure and rose	4 ,,
* 'King of Delphiniums'	Metallic violet and white	3 ,,
* 'Lady Conway'	Silvery azure	3 ,,
'Lamartine'	Violet	Dwarf
* 'Lorenzo'	Bronzy violet and white	5 feet
* 'Medea' (Ferguson)	Metallic, violet, white eye	3 ,,
* 'Minerva'	Pale azure, shaded	4 ,,
'Mrs. Helm'	Silvery blue	Tall
* 'Macbeth'	Deep bronzy violet	4 feet
'Mme. Laizer'	Light blue, dark eye	Dwarf
'Mrs. Brunton'	Palest azure	2½ feet
'Moerhoemii'	Newest white	3 ,,
* 'Mrs. Creighton'	Deep blue	4 ,,
* 'Nineveh'	Azure, dark eye	3 ,,
* 'Nerissa'	Sky blue and white	4 ,,
* 'Ophelia'	Silvery blue	4 ,,
'Orchioides'	Creamy white, black eye	3 ,,
* 'Pharaoh'	Azure and white	3 ,,
'Persimmon'	Silver blue	2½ ,,
* 'Rev. E. Lascelles'	Topaz, white eye, the finest double	6 ,,
'Shylock'	Bronzy violet and white	5 ,,

* Double-flowered varieties.

† The heights given are generally about two-thirds of the height attained by the same variety at Wisley (see Journal R.H.S. xxxviii. p. 262).

German Flag Iris.

asiatica, violet, tall.
pallida dalmatica, W. Wilks var., azure.
'Dorothea,' pale blue.
germanica Kochii, violet.
'Her Majesty,' pink.
'Innocenza,' white.
'Jacquiniana,' chocolate.
'Kitty Reuthe,' blue and white.
'Mrs. Reuthe,' mauve blue.
'Mrs. H. Darwin,' creamy veined.
'Mrs. Neubronner,' golden.
'Lohengrin,' pink, extra large.
'King of Iris,' rosy pink.
'Princess Beatrice,' pale blue.
'Queen of May,' pink.
'Robert Burns,' yellow and bronze.
'The Bride,' white.

Paeonies.

alba superba, grand white.
albiflora laciniata, single.
'Amalthea,' pale pink.
'Baroness Schröder,' rose and cream.
'Duchesse de Nemours,' ivory.
festiva maxima, white and claret.
'Lady L. Bramwell,' silvery pink.
'Lemon Queen,' silvery centre.
'Marie Jaquin,' white.
'Mme. Calot,' flesh.
'Mme. Rousellon,' pale flesh
'Modeste,' bright rose.
'Monsieur Rousellon,' ivory and blush.
'Mrs. Chamberlain,' rosy pink.
'Peach Blossom,' flesh and salmon.
'Sulphureus,' white and yellow.
'Triomphe,' silvery rose.
Whitleyi major, grand white.

Tree Paeonies vary in colour from white to crimson and amaranth.

Giant Poppies.

Eighteen best.

'Brightness,' orange scarlet, tall.
bracteatum, blood red.
'Blush Queen,' black spots.
'Fürstenkind,' blush and silver.
'Grenadier,' largest scarlet.
'Hesperia,' self scarlet.
'Jennie Mawson,' creamy salmon, black spots.
'Lady Roscoe,' soft salmon.
'Lovely,' intense scarlet.
'Mogul,' orange scarlet.
'Princess Ena,' pale salmon.
'Queen Alexandra,' soft salmon.
'Rembrandt,' brick red.
'Silver Blick,' scarlet, white blotches.
'Silver Queen,' French white.
'Tulip,' spotted scarlet, 2½ feet.
'Tom Tit,' dwarf scarlet.
'Unique' (Perry), scarlet fringed, 2 feet.

Pyrethrums.

*'Agnes Mary Kelway,' rosy pink.
*'Albert Victor,' crimson.
'Beatrice Kelway,' rosy pink.
'Carmen Sylva,' white.
'Bassanio,' deep red.
*'Decoy,' bright crimson.
*'Fairy,' rose pink.

* Single varieties

*' General French,' dark crimson.
' Jubilee,' intense red.
*' Jas. Kelway,' dazzling crimson.
*' Mrs. Allfrey,' crimson.
' Mrs. Santley,' rosy.
' Mrs. Bateman Brown,' crimson.
*' Margaret Moore,' blush.
' Queen Mary,' very large pink.
*' Sylvia,' pale pink.
' Warrior,' velvety red.

Phloxes.

Growing 1 to 2 feet.

' A. J. Ashmore,' flesh pink.
' Argon,' blush.
' Belvedere,' deep rose.
' Doreen,' salmon pink.
' Elizabeth Campbell,' pale cerise.
' Eugene Danzanvilliers,' white and black.
' Fiancée,' white, extra.
' Frau A. Büchner,' best white.
' Freifräulein von Lassburg,' large white.
' Gruppenkönigin,' rose dark eye.
' John Lamont,' lilac rose.
' Jocelyn,' bright dark crimson.
' Lady Tweeddale,' white with blush.
' Mme. P. Charpentier,' white.
' Mrs. J. Harkness,' salmon.
' Mrs. Oliver,' soft salmon.
' Miss Pemberton,' crimson lake.
' Rijnstroom,' large pink.
' Regulus,' rosy carmine.
' Sheriff Ivory,' deep red and rose.
' Snowdon,' large white.
' Spirite,' rose and crimson.
' Tapis blanc,' dwarf white.

Growing 2½ to 4 feet.

' Aurora,' reddish crimson.
' Baron von Dedem,' striking crimson.
' Coquelicot,' dazzling carmine.
' Countess of Shrewsbury,' white, pink eye.
' Dame de Beauté,' lilac and white.
' Dr. Charcot,' heliotrope.
' Etna,' fiery carmine.
' Flambeau,' bright crimson.
' G. A. Strohlein,' orange scarlet.
' General von Heutsz,' salmon red.
' Iris,' shaded violet.
' Mme. Neera,' silvery mauve.
' Mrs. Jenkins,' fine white.
' Selma,' rosy crimson.
' Solon,' carmine red.
' Starlight,' orange red.

* Single varieties.

PLAN OF HERBACEOUS BORDER.

Back Row.
6 feet apart.

1. *Galega Hartlandii.*
2. *Bocconia cordata.*
3. *
4. *Helianthus multiflorus.*
5. *Aster* 'White Queen.'
6. *Campanula lactiflora.*
7. *
8. *Anchusa italica*, Dropmore var.
9. Pampas Grass.
10. *Echinops Ritro.*
11. *

Third Row.
3 feet apart.

35. *Aster* 'Mrs. Rayner.' / *Achillea Eupatoria.*
36. *Delphinium* 'Persimmon.' / *Anemone japonica* 'Queen Charlotte.'
37. *Aconitum variegatum.* / *Cimicifuga simplex.*
38. Pink Hollyhock. / *Delphinium* 'Sailor Prince.'
39. *Monarda didyma.* / Spanish Broom.
40. *Eryngium tripartitum.* / *Aster cordifolius magnificus.*
41. *Telekia macrocephala.* / *Gypsophila acuta.*
42. *Iris Monnieri.* / *Boltonia latisquama.*
43. *Cytisus Andreanus.* / *Campanula bononiensis alba.*
44. *Delphinium* 'Calypso.' / *Boltonia asteroides.*
45. *Aster novae-angliae ruber.* / *Geranium pratense striatum.*

Second Row.
3 feet apart in clumps of 3 ∴

69. *Iris flavescens.*
70. Poppy 'Mrs. Marsh.'
71. *Aster* 'Coquette.'
72. *Iris pallida dalmatica.*
73. *Achillea* 'The Pearl.'
74. *Phlox* 'Coquelicot.'
75. Double Gypsophila.
76. Scarlet Lychnis.
77. Poppy 'Fürstenkind.'
78. *Aster* 'St. Egwyn.'
79. *Phlox* 'Jeanne d'Arc.'

* The blank spaces are left for flowering shrubs as named in the letterpress.

PLAN OF HERBACEOUS BORDER—*continued.*

Back Row.
6 feet apart.

12. *Verbascum olympicum.*
13. *Aster* ' R. Parker.'
14. *Tritoma glaucescens.*
15. ' King of Delphiniums.'
16. *Artemisia lactiflora.*
17. *
18. *Mulgedium Bourgei.*
19. *Helianthus* ' La Perle.'
20. *Aster* ' Lil Fardell.'
21. *
22. *Eremurus robustus.*

Third Row.
3 feet apart.

46. *Carduus heterophyllus.* / *Delphinium* ' Hermia.'
47. *Eremurus Elwesii.* / *Centaurea macrocephala.*
48. *Aconitum Wilsoni.* / *Astilbe Davidii.*
49. *Berberis stenophylla.* / *Centaurea Tourneforti.*
50. *Aster* ' Daydream.' / *Delphinium* ' Hamlet.'
51. *Aster* ' Mrs. S. T. Wright.' / *Campanula pyramidalis.*
52. *Eremurus Bungei.* / *Eryngium planum.*
53. *Epilobium angustifolium.* / *Aconitum Mielichheferi.*
54. *Solidago*, tall yellow. / *Delphinium* ' Nineveh.'
55. *Campanula macrantha alba.* / *Genista aetnensis.*
56. *Onopordon Salteri.* / Poppy ' Grenadier.'

Second Row.
3 feet apart in clumps of 3 ∴

80. *Iris intermedia.*
81. *Anemone japonica elegantissima.*
82. *Delphinium orchioides.*
83. *Phlox* ' Etna.'
84. *Romneya Coulteri.*
85. *Iris spuria.*
86. *Phlox* ' Dr. Charcot.'
87. Poppy ' Marie Studholme.'
88. *Aster* ' Mrs. Day.'
89. *Iris asiatica.*
90. *Lupinus Moerheimi.*

23. *Rudbeckia* ‘Golden Glow.’

24. *Delphinium* ‘Lorenzo.’

25. *

26. *Tritoma* ‘Star of Baden.’

27. *Anchusa italica* ‘Opal.’

28. *Aster p. pulcherrimus.*

29. *

30. *Aster* ‘Climax.’

31. *Delphinium* ‘Cymbeline.’

32. *Pyrethrum uliginosum.*

33. *

34. *Helenium autumnale.*

57. *Clematis recta.* / *Erigeron speciosus.* — 91. *Anemone japonic rosea superba*

58. *Spiraea Van Houttei.* / *Veronica sibirica.* — 92. *Phlox* ‘G. A. Strohlein.’

59. Scarlet Tritoma. / *Crambe cordifolia.* — 93. *Aster* ‘Brightness.’

60. *Geranium armenum.* / *Helenium striatum.* — 94. *Iris* ‘Mme. Chereau.’

61. *Cistus ladaniferus.* / *Hemerocallis fulva.* — 95. Poppy ‘Queen Alexandra.’

62. *Malva thuringiana.* / *Verbascum densiflorum.* — 96. *Aster* ‘Enchantress.’

63. *Delphinium* ‘Bandmaster.’ / *Epilobium hirsutum album.* — 97. *Iris* ‘Rolette.’

64. *Centaurea ruthenica.* / Red Crown Imperial. — 98. *Delphinium* ‘Persia.’

65. *Gynerium pumilum* (Pampas). / *Liatris scariosa dubia.* — 99. *Anemone japonica* ‘Whirlwind.’

66. *Hypericum Henryi.* / *Phlox* ‘Lady Shrewsbury.’ — 100. Poppy ‘Royal Scarlet.’

67. *Philadelphus erectus.* / *Thalictrum Delavayi.* — 101. *Phlox* ‘Iris.’

68. *Physalis Bunyardi.* / *Geranium Lamberti.* — 102. *Iris* ‘Innocence.’

* The blank spaces are left for flowering shrubs as named in the letterpress.

Top. Front Row.

In clumps of three, starting in front of *Iris flavescens*.

103. *Pyrethrum* 'Decoy.'
104. *Platycodon Mariesii.*
105. *Geum Eweni.*
106. Paeony 'Amalthea.'
107. *Pentstemon* 'Southgate Gem.'
108. *Aquilegia chrysantha.*
109. *Pyrethrum* 'Sylvia.'
110. *Chrysanthemum maximum* 'Mrs. C. Lowthian Bell.'
111. *Rudbeckia Newmannii.*
112. Paeony 'Glory of Hayshe.'
113. *Achillea Millefolium rubra.*
114. *Campanula Van Houttei.*
115. *Pyrethrum* 'Atossa.'
116. *Nepeta Mussini.*
117. *Doronicum* 'Harpur-Crewe.'
118. *Dictamnus ruber.*
119. *Aster* 'Demus.'
120. *Pyrethrum* 'Fairy.'
121. *Coreopsis grandiflora.*
122. *Campanula persicifolia*, blue.
123. Paeony 'Mme. Lebou.'
124. *Phlox* 'Belvedere.'
125. *Heuchera micrantha.*
126. *Pyrethrum* 'Carmen Sylva.'
127. *Campanula persicifolia Moerheimii.*
128. *Paeonia anemoneflora alba.*
129. *Geum* 'Mrs. Bradshaw.'
130. *Oenothera Youngii.*
131. *Pyrethrum* 'General French.'
132. White Aquilegia 'Munstead.'
133. Paeony 'Voluptueuse.'
134. *Phlox* 'Tapis blanc.'
135. *Inula grandiflora.*
136. *Pyrethrum* 'Albert Victor.'

THE GENUS *AGAPANTHUS*, WITH A DESCRIPTION OF *A. INAPERTUS*.*

By A. Worsley, F.R.H.S.

This genus has been considered monotypic,* but I think that, even if we restrict our observations to the forms grown in British gardens, we find at least two (if not three) distinct types. Among the forms known in our gardens we find that some are evergreen, some deciduous; some have stems a few inches in length, others are acaulescent; some have creeping rootstocks several inches to a foot long, others have not; some have more or less erect flowers, others are drooping; some have short, open funnel-shaped tubes, others longer campanulate tubes; and some have widely-expanded flowers, whilst in other cases the flowers are semi-patent. These differences are in themselves enough to throw grave doubt on the monotypic character of the genus.

I have raised more than a thousand seedling Agapanthi from several dozen different garden types of *A. umbellatus*, *A. Mooreanus*, and from the hybrid between them raised by Mr. Scheubel, and I have found that these various forms reproduce themselves from seed with great constancy. None of them has produced any of the characters peculiar to *A. inapertus*, and hence I think it is clear that the latter plant is specifically distinct from *A. umbellatus*.

Among the forms of *Agapanthus* which I cultivate I can distinguish nine without considering colour varieties:

(1) *A. umbellatus*.—An evergreen plant with large wide leaves, and open-funnel-shaped sub-erect widely expanded flowers. This includes the *A. Leichtlini* of gardens.

(2) *A. Mooreanus*.—A deciduous plant with smaller leaves and flowers, the latter very widely expanded and even recurved, and with shorter tubes.

(3) *A. hybrida* (of Scheubel).—A fertile hybrid between (1) and (2), and fairly equipoised between them. It is deciduous, and is heavily coloured blue or purple on the short stem.

(4) Crosses between (1) and (3) are fairly equipoised, are heavily coloured on the short stem, and are all evergreen.

(5) *A. inapertus*.—A deciduous plant with creeping rootstock, short leaves, a tall scape of drooping semi-patent flowers with long campanulate tube and short pedicels.

* G. Beauverd in *Bul. Soc. Bot. Genève*, Vol. II. (1910), with fig.; Syn. I. *A. Weillighi* (hort.). The author admits 3 species and 4 varieties in the genus. He classes them thus—*A. inapertus* [Beauverd sp. nov.]; *A. africanus* [Hoffmannsegg, *Ver. Pflanzenculturen*, 35 (1824)]; and *A. caulescens* [Sprenger ex Wittmack *Gartenflora*, 50. 21 et 281, cum tab. 1487 (1901)].

(6) *A. umbellatus caulescens*.—A recently imported evergreen form from the Cape, with creeping rootstock a foot long, distinct stem some inches long, small foliage, but not distinct from the type in the general aspect of the inflorescence, although the exserted stamens seem distinct.

(7) *A. umbellatus repens*(?).—A small-growing form with creeping rootstock, narrow and short leaves and flowers like *A. Mooreanus*. A variegated-leaved form of this has been long in cultivation. It grows slowly and demands a very dry soil.

(8) *A. umbellatus monstrosus*.—A multipetalous form raised from a 12-petalled flower. This is a most robust plant with leaves 2½ to 3 inches wide and several hundred flowers to the umbel.

(9) *A. umbellatus variegatus falcatus*.—A garden form with falcate leaves.

[NOTE.—The globose-shaped umbels, which have earned for some forms the name *A. globosus*, are an individual and not a racial character, and appear sporadically in the seedlings of all forms of *A. umbellatus*.]

COMPARATIVE DESCRIPTION OF THE FLOWERS OF SOME OF THE ABOVE FORMS AND SPECIES.

	Limb	Span	Tube	Max. width of Segs.		
A. umbellatus No. 6	1 7/8	1 7/8	1/2	3/8	Stamens	exserted.
,, ,, ,, 4	2	2 3/8	1/2	3/8	,,	short.
,, ,, ,, 8	2 1/4	2 1/4	3/4	1/2	,,	rather short.
,, ,, ,, 1	2 3/8	1 7/8	1	1/2	,,	short.
,, *Mooreanus* ,, 2	1 1/8	1 1/2	3/8	3/8	,,	,,
,, *inapertus* ,, 5	1 7/8	7/8	7/8	3/8	,,	,, Tube darker.

All these measurements are in inches.

It will be noticed that it is only in *A. Mooreanus*, and in its crosses, that the span of the flowers exceeds the limb.

A. INAPERTUS.

Rootstock creeping, stout, strictly deciduous. Stem about 3 inches high, curving to an erect pose from the creeping rootstock. Leaves 8, stiff, erect, appearing before the flower scape and already partly deciduous at the flowering period, glaucous, deeply channelled, 1½ foot long by 1½ inch wide. Scape 4 feet high, bearing an umbel of less than 100 flowers. Pedicels very short, 1½ inch long. Flowers erect in the bud, but hanging down perpendicularly on expansion, which occurs in August; deep blue in the tube, lighter blue in the free segments, scentless, semi-patent, span ⅞ inch. Tube, sub-campanulate, ⅞ inch long. Segments, the free ends an inch long and the entire limb 1⅞ inch long by ⅜ inch maximum width. Stamens shorter than limb. Anthers black, pollen greyish, inconspicuous. Style not exserted. Stigma entire. Fruit and seeds unknown.

[NOTE.—This is not a moisture-loving plant like *A. umbellatus*, and will withstand severe drought. In this respect it agrees with

another creeping form described under Section 7. It came to my garden from Messrs. C. G. VAN TUBERGEN, jun., of Haarlem, and is possibly hardy in the South of England. It received an Award of Merit R.H.S. on Aug. 12, 1913. It was originally sent out by M. MAX LEICHTLIN, of Baden-Baden, about 1898, under the name of *A. Weillighi*, by which name it is now known in gardens. It was first described and figured by M. G. BEAUVERD in 1910 as *A. inapertus*. He says that it was first sent from Shilouwane in E. Transvaal to the Herbier Boissier, in 1903, by M. H. JUNOD, so it would seem as though M. MAX LEICHTLIN had received an earlier importation of the same species.]

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

XV.—Pollination in Orchards.—II.

The Flowering of Pears.

By F. J. Chittenden, F.L.S.

It was pointed out in a former communication on the flowering of apples * that there appears to be a fairly definite sequence in the order of flowering in varieties of apples, and that the variation in an observed order is, in any year, relatively slight, no matter in what part of the world the trees may be growing.

In the general introduction to that communication the frequent occurrence of self-sterility among apples was pointed out, and the need for planting varieties flowering at about the same time in close proximity to one another in order that cross-pollination might be easily effected was referred to. Tables were given showing the relative order of flowering of the principal varieties of apples.

In the present article the relative time of flowering of pears is noted.

Self-sterility is a phenomenon at least as common among pears as it is among apples, and one long recognized in this country, though frequently lost sight of. In the former article † the work of Waite in America on this subject was alluded to, but an interesting communication to our Society on some work done in this country at a much earlier date was overlooked. This communication shows that the need for the cross-pollination of certain varieties of pears was clearly apprehended by the writer, and it will not be without interest to reprint part of it here. The Rev. George Swayne, writing from Dyrham on August 2, 1822, refers, in a letter ‡ read before our Society on August 6, 1822, to the general unfruitfulness of certain varieties of pears, and goes on to recount some experiments which he made with the object of avoiding this unfruitfulness, as follows :—

"I am myself possessed of a striking instance of this untoward disposition in an individual of the genus *Pyrus*, which has for a long time baffled all my attempts to alter its infertile habits ; it is that of a 'Gansell's Bergamot,' which has grown for twenty years or more in its present situation against a wall, part of which has a south-west and part a south-east aspect.

"The tree has all the appearance of health and sufficient luxuriance, and has been for several years constantly covered with a profusion of blossoms at the proper season, but has never before this borne more than three or four pears in any one year, and most frequently

* Chittenden, F. J., in *Journal R.H.S.* xxxvii. pp. 350 *et seq.*
† *Loc. cit.* p. 350.
‡ *Transactions of the Horticultural Society of London*, V. (1824), 208-213.

not a single one. It never occurred to my observation, before the year 1820, when I was much occupied in the artificial impregnation of different kinds of fruit, that, out of from nine or fewer, to fifteen or more florets, of which the cluster (botanically corymbus) of the pear-tree consists, only the three lower ones (generally speaking) *set*, or, in other words, are effectually impregnated, for fruiting. Recollecting the practice of the best gardeners, of topping their early beans, *i.e.* of pinching off with the forefinger and thumb the uppermost blossoms, some apparent, and others in embryo, of the general spike, for the purpose of setting the lowest and earliest ones, which would otherwise in most cases prove abortive, I conceived, that removing the upper and central blossoms of the corymbus of the pear, as soon as it could conveniently be done, would have a similar good effect in invigorating the remaining ones, and causing them to set with greater certainty. With this in view, in the spring of 1821, as soon as the three lower blossoms of the corymbi began to show their *white* faces, I set to work with my sharp-pointed scissors on two pear-trees, the one, the 'Gansell's Bergamot' above mentioned and the other a 'Brown Beurré,' and in as short time as I could have properly thinned two dozen bunches of grapes I divested both these trees of at least three-fourths of all their budding honours. On the 'Beurré,' this operation subsequently appeared to have the best effect. For there was scarcely an instance in which the three remaining blossoms did not *set*, which afterwards produced the finest crop of pears I have yet gathered from that tree. But on the intractable 'Gansell,' although the blossoms at first seemed to set, and many of them did not fall off till midsummer, when they were nearly as large as common gooseberries, yet not a single pear arrived at maturity. By dissecting many of the largest of those which fell off last, and comparing them with some of the 'Beurrés' of the same age and size, it was plain that the kernels of the former had not been impregnated. This circumstance induced me to think that there must be some imperfections in the essential parts of the blossoms.

"In the following spring of 1822, on attending to the blossoms of this tree, which blooms earlier than any other pear-tree which I have, they appeared to me to remain much longer in a globular state, without expanding, than any other variety of pear which I have had an opportunity of noticing. I fancied likewise that the pointal was fit for impregnation before the anthers were ripe, and even before the petals expanded; and from the peculiarly slender and delicate make of the latter, as it struck me, I supposed that it ceased to be in a proper state as soon as it became exposed to the sun and air; I therefore concluded, that there might possibly be a chance of obtaining fruit, by depriving the blossoms of their petals before they expanded, and inclosing with each floret in this state, within a paper envelope (as is my mode of effecting artificial impregnation), a riper *blossom*, viz. one that had just begun to diffuse its farina, either one of its own or, preferably, of some other variety of pear. Accordingly on March 27, 1822, I began this operation,

and in a day or two had tied up in the manner just mentioned twenty-seven blossoms. Ten of these envelopes contained blossoms of the Beurré Pear, which (it not blooming so early as the Gansell) were the only ones I could then find in a state of expansion. Fourteen (to make up, with the former number, two dozen) contained blossoms from the same tree, and three blossoms of the Pound Pear. From the latter, presenting a large and coarse appearance, I had little expectation. I intended to have done many more, but the weather getting colder, and being myself not quite in health, I neglected it till it was too late. The papers were not taken off till April 15, on which day the weather began to be warmer without sunshine. You will please to observe that I had previously cut off from all the corymbi, with which the tree was abundantly furnished in every part, all the blossoms except the three lower ones, as in the former year ; and that, having tied up but one of these in each corymbus, I immediately cut off the two remaining ones. The blossoms were operated on in different parts and aspects of the tree, for part of it, as I said before, faced the south-east and part the south-west. Of the ten blossoms treated with the Beurré Pear, *eight set*, two of which afterwards fell off, but I suspect not fairly, and six are now proceeding to maturity. *One* only of the *fourteen*, where its own blossoms were used, now remains. Of the *three* wherein the Pound Pear was concerned, the whole failed. The only pear now on the tree which set naturally, and on which no operation was performed, was produced on a cluster of blossoms, at the extremity of a leading horizontal shoot of last year, which did not make its appearance until after the others had dropped off. . . . The pears are now from five and a half to seven and a half inches in circumference.

"Whether the results of the above detailed experiments be such as to authorize an expectation that artificial fecundation will hereafter become of so much importance to gardeners in the instances just alluded to as those at present recognized, of the cucumber, the melon, the early bean, and the Hautbois strawberry, must be left to futurity to ascertain."

Mr. SWAYNE'S communication is followed by a note from the Secretary :—"Mr. SWAYNE sent to the Meeting of the Society, on October 1, specimens of the Pears alluded to in the foregoing communication. They were unusually large, and very handsome. The cross impregnation had not produced any change in the appearance of the fruit, nor was any difference in flavour discovered."

It seems perfectly clear therefore that Mr. SWAYNE clearly recognized the value of cross-pollination in the case of some varieties of pears, and some subsequent writers on fruit-growing refer to it in more or less lucid terms. For instance, Mr. HARRISON, in *A Treatise on the Culture and Management of Fruit Trees* (1823), advocated hand pollination of pears which flower abundantly but fail to set fruit, a common experience, he says.* He does not, however, make it clear

* *Loc. cit.* p. 148.

whether he uses pollen of other varieties or not, though he explicitly recommends that this should be done in the case of the White Nectarine, among other fruits.*

It was not, however, until WAITE † published his results that really serious attention began to be given to the matter, and since then this factor has become recognized more and more as an important one in governing the arrangement of the orchard. So far as our present knowledge goes, we know it is advisable to plant varieties flowering at approximately the same time in close proximity to one another so that insects can readily carry pollen from one tree to another. With the object of assisting this the following list made at Wisley has been drawn up.

It is desirable to point out that we do not yet know with certainty whether better fruit and more of it is produced when some varieties furnish the pollen than when it comes from others, nor do we know whether the comparatively few self-fertile varieties are more fruitful when cross-pollinated. These matters are forming the subject of further investigation at Wisley and elsewhere.

The following list is based upon observations made in 1908, 1910, 1911, 1912, and 1913. The observations were made as a rule on two trees of the variety (one generally on quince, the other on pear stock, but the stock apparently makes little or no difference in the flowering time when the trees have reached a fair age). The date of full flowering was noted in each case, full flowering meaning that about 50 per cent. of the blossoms were open. The average number of days after the date of full flowering of the earliest variety is given before the name of the variety in the list, the earliest variety being taken as 1.

As with apples there is no hard and fast order of flowering; every season sees some alteration in it; but the list is accurate so far as to show what varieties may be expected to be in flower at about the same time.

A few flowers on a tree may be open long before the bulk, just as it is no uncommon thing to find a few flowers open long after the rest on a tree. Both cases were well illustrated at Wisley this season, for 'Brockworth Park' had stray flowers open in mid January and all through the winter and early spring a few flowers could be found, the bulk not opening until April; while almost every variety bore summer flowers in greater or less profusion. By taking the date of flowering as that at which about half the flowers are open these curious seasonal variations are avoided and a comparison of the effective period of flowering is made possible.

* *Loc. cit.* p. 235.

† WAITE, "Pollination of Pear Flowers" (*U.S.A. Dep. Agr., Div. Veg. Path., Bull.* 5, 1895).

LIST OF PEARS IN ORDER OF FLOWERING AT WISLEY.

1·2 Brockworth Park
1·4 Zoë
2 Doyenné d'Alençon
3·5 Directeur Hardy
Forelle
4·6 Doyenné Boussoch
5·1 Knight's Monarch
5·2 Belle Guerandaise
Beurré Baltet Père
Madame Treyve
5·5 Doyenné d'Eté
6·2 Jargonelle
5·7 Beurré d'Anjou
6·8 Aspasie Aucourt
Beurré Easter
Beurré Hardy
Chaumontel
6·9 Citron des Carmes
Marquis
7 Beurré d'Avalon
7·1 Passe Crassane
7·2 Baronne de Mello
Beurré Diel
Van Mons Léon Leclerc
7·3 Thompson
Verulam
7·4 Dana's Hovey
Princess
7·5 Conseilleur de la Cour
7·6 Conference
7·8 Brown Beurré
Madame Millet
Winter Nélis
7·9 Beurré Superfin
Duchesse d'Angoulême
8·1 Beurré d'Amanlis
Gratioli de Jersey
Van Mons
8·2 Beurré Bachelier
Beurré de Jonghe
Souvenir du Congrès
8·4 Beurré Giffard
Fondante de Cuerne
8·5 Colmar d'Eté
8·6 Beurré Fouqueray
Charles Ernest
Triomphe de Jonghe
8·7 St. Luke
8·8 Bergamotte Heimbourg
Duchesse de Bordeaux
8·9 Comte de Lamy
Marie Benoist
9 Fondante d'Automne
Nouvelle Fulvie
9·1 Bergamotte Esperen
9·3 Marguerite Marillat
White Doyenné
9·4 Beurré d'Aremberg
Durondeau
Summer Beurré d'Aremberg
9·7 Fondante de Thirriot
Winter Orange
9·8 Beurré Clairgeau
Olivier de Serres
Petite Marguerite
9·9 Calebasse Grosse
10 Seckle
10·1 Uvedale's St. Germain
10·2 Bellissime d'Hiver
Louise Bonne of Jersey
Zéphirin Grégoire
10·3 Magnate
10·4 Clapp's Favourite
Emile d'Heyst
Marie Louise d'Uccle
President Barabé
Beurré Jean van Geert
10·6 Parrot
10·8 Beurré de l'Assomption
11·1 Autumn Nélis
Triomphe de Vienne
11·2 Kelway's King
11·4 Catillac
11·5 Beurré Dubuisson
11·7 Beurré Dumont
11·8 Fertility
12 Beurré Rance
Le Lectier

Nec Plus Meuris
12·2 Hacon's Incomparable
Huyshe's Prince Consort
Josephine de Malines
President d'Osmondville
12·3 William's Bon Chrétien
12·5 Belle Julie
Huyshe's Victoria
12·8 St. Edmund
13·3 Beacon
13·6 Hessle
13·8 Gansel's Bergamot
13·9 Beurré Capiaumont
Beurré Sterckmans
14 Grégoire Bordillon
Dr. Jules Guyot
14·2 Beurré Bosc
14·3 Beurre de Mortillet
Marie Louise
14·7 Gilogil
14·8 Passe Colmar
15 General Todleben
15·6 Jean de Witte
Nouveau Poiteau
15·7 Glou Morceau
15·8 Doyenné du Comice
Michaelmas Nélis
16 Pitmaston Duchess
16·7 Napoleon

There appear to be very few lists existing giving averages of order of flowering over several years. Mr. C. H. HOOPER has kindly placed at my disposal some lists he collected from various sources, but they unfortunately relate to one year only as a rule. Some appear to give dates of opening of the first flower, some of full flower, and some of a few days after opening of first flower. These and other differences make the lists difficult to compare with one another profitably. There is a general similarity in the lists though in one or two instances there are marked differences from the Wisley order. These differences are probably to be accounted for partly for the reasons given above and partly because there are minor variations from the usual order of flowering every year.

It is interesting to note that in a list from Victoria, Australia,* 'Winter Nélis,' 'Souvenir du Congrès,' and 'Uvedale's St. Germain' are named as mid-season flowering varieties, 'Beurré Berckmans' (possibly a misprint for 'Beurré Sterckmans') a little later, and 'Beurré Bosc' and 'Williams' Bon Chrétien' among the late ones, the other varieties named in Mr. WALLIS' list not appearing in ours. These seem to indicate that pear varieties, like apples, maintain their relative times of flowering even at the Antipodes. Mr. HOOPER'S own observations made at Wye, Kent, give the order for full flowering, from an average of three years, 1908–1910, as follows: 'Duchesse d'Angoulême,' 'Beurré Clairgeau,' 'Beurré Diel,' 'Marguerite Marillat,' 'Williams' Bon Chrétien,' 'Doyenné Boussoch,' 'Beurré Giffard,' 'Dr. Jules Guyot,' 'Clapp's Favourite,' 'Beurré Hardy,' 'Triomphe de Vienne,' 'Souvenir du Congrès,' 'Jargonelle,' 'Catillac,' 'Marie Louise d'Uccle,' 'Durondeau,' 'Pitmaston Duchess,' 'Doyenné du Comice.' The most important differences between this list and the Wisley one are the early position of 'Williams' Bon Chrétien' and the late position of 'Durondeau.' It is possible that "full flower"

* WALLIS, E., "Sterility in Fruit Trees." (*Jour. Dep. Agr. Victoria* ix. (1911), pp. 18, 19).

does not mean quite the same in this case as it does in the Wisley list, and that would make some little difference; further, it is to be remarked that only eight days separate the earliest and the latest in Mr. HOOPER'S list, whereas, taking the same varieties at Wisley (over a longer period), there is an average of twelve days between the full-flowering of the earliest and the latest.

It may be concluded that there is a general regularity in the order of the flowering of pears as with apples; but that each season sees deviations from the order, not sufficiently marked, however, to destroy the value of the list given above as a guide to the varieties that should be planted near one another in order to facilitate pollination.

I have to thank several of the senior students in their successive years for assistance in making the records on which these observations are based, and particularly Messrs. B. P. PERRY, A. J. PREECE, and C. W. DANIELS.

XVII.—AMERICAN GOOSEBERRY MILDEW

(*Sphaerotheca mors-uvae* (*Schwein.*) *Berk.*)

By F. J. CHITTENDEN, F.L.S.

THIS now too well-known disease has been already described and its history detailed in our JOURNAL,* but it will probably be not without interest to recount the behaviour of the gooseberries at Wisley towards it.

The origin of the outbreak at Wisley is not known. It was first noticed on a few bushes in November 1910, after the leaves had fallen. Careful examination showed that about forty bushes were slightly attacked, some rather worse than others, but none to an extent greater than would follow from an attack starting in late summer, especially in such a wet period as occurred in 1910 (July–October rainfall 8·73 in.).

None had been seen in previous years, although watch was kept for anything of the kind, and no gooseberry bushes had been brought into the garden for two years prior to the outbreak. A few currants, which are also liable to attack, were introduced, but examination of these showed no trace of mildew. No gardens in the immediate neighbourhood are known to have been attacked, nor are any other gooseberries growing within a mile of the site of the plantation. It would therefore seem that the spores of the fungus were brought into the garden either on some other plant or on packing material, or by wind or insects from a considerable distance.

The bushes were pruned in January 1911, every shoot being shortened back over the whole plantation, both on the bushes attacked and on those free from the attack, in the manner known as "tipping," so as to remove all parts of the shoot on which the resting fruits of the fungus might be present. It was, however, feared that the tipping was done too late to prevent many of the perithecia from falling to the ground and remaining as a source of danger in the succeeding season. It was, therefore, a pleasant surprise to find that in the very dry season of 1911 no trace of the disease was found until the very end of September, and then on one bush only, this piece being promptly destroyed.

The exigencies of cultivation necessitated the removal of the bushes in November 1911 to a site about 200 yards distant from their former one, and in removing them the greater part of the soil about them was left perforce behind, since it was of so light a nature. It is interesting to note that the common gooseberry sawfly had been a prevalent pest from 1907 to 1911, but after the removal of the bushes

* SALMON, E. S. "The Gooseberry Mildew." (*Journal R.H.S.* xxv. (1900), p. 139.)
ERIKSSON, J. "Gooseberry Mildew and Gooseberry Cultivation." (*Loc. cit.* xxxiv. (1908), p. 469).

only very few were found in 1912, owing, doubtless, to the pupæ having been left behind with the old soil. This point is of some importance, for the perithecia of the fungus (if there were any remaining over from 1910 crop) would probably have been left behind too. The bushes were pruned and it seemed evident that in January 1912 they were free from the fungus.

About the time the fruits were swelling in May 1912, however, the mildew again appeared, mostly at one end of the plantation (not on varieties that had been attacked in 1910), but quickly spread all through, attacking not only the young growths but seriously damaging the fruits as well. Whence did the attack come? No new gooseberries or currants had been introduced to bring it afresh, and yet it was to all appearance a fresh attack. Had insects or wind brought the spores, or had someone coming from an affected plantation brought them on his clothes and left them behind in walking through the bushes?

The bushes were again thoroughly tipped in October as soon as growth had ceased, and, it was hoped, before the perithecia had fallen. But this measure was quite in vain, for in 1913 the attack was at least equally bad, commencing at the end of May, spreading rapidly through the plantation, and attacking the berries as in 1912. Probably, if the berries were not attacked, the disease would be regarded as not more serious than the ordinary rose mildew, but the attack on the fruit causes the loss of a great part of the crop, the berries being checked in growth, badly disfigured, and not able to be marketed. [It is now, rightly, illegal to send mildewed fruit to market, and several cases of transgression have recently met with fines.]

No spraying measures were adopted until 1913, but it was thought well to spray in early May with potassium sulphide (liver of sulphur) as a preventive measure, which was, as we have seen, unavailing. The spraying was done before the mildew made its appearance, with a solution of 1 oz. to 3 gallons of water. [If complete protection by covering the foliage with a fungicide were aimed at, it would have been necessary to spray every other day or so, since the bushes were in a state of rapid growth. This was of course impossible, and the most that could be hoped for was the protection of the least susceptible parts and the destruction of any spores that happened to be germinating. This spraying had no bad effect on the foliage. It was carried out during dull weather, as were the sprayings to be referred to immediately.]

After the outbreak appeared a further spraying with sulphide of potassium (1 oz. to 3 gallons of water) was carried out. This had a remarkable effect upon the bushes, some of them being almost completely defoliated within 24 to 36 hours, others suffering not at all.

Table I. shows the extent of the damage and the manner in which the different varieties responded to the spraying.

It should be explained that there are usually two bushes of each variety in the plantation, though occasionally there are three and sometimes only one. The number following the name in the table shows the number of bushes behaving in the manner indicated at the head of the column.

TABLE I.—SHOWING EFFECT OF SPRAYING GOOSEBERRIES WITH LIVER OF SULPHUR AT WISLEY, JUNE 1913.

Varieties losing many leaves.		Varieties losing some leaves.		Varieties unaffected.	
Australia	2	Alma	2	British Queen	2
Beauty	1	Antagonist	2	Berry's Early Kent	2
Champagne White	2	Bobby	1	Bayslate Hero	2
Clayton	3	Careless	2	Bollin Hall	2
Clifton	1	Champagne Yellow	1	Broom Girl	2
Crown Bob	2	Cramp	2	Candidate	3
Diamond	2	Coppice Lass	2	Catherina	1
Eskender Bey	2	Criterion	2	Champagne Red	1
Flora	1	Crown Bob	1	Coiner	3
Flixtonia	1	Drill	2	Crystal	3
Golden Gem	2	Dan's Mistake	1	Duster	1
Glenton Green	2	Fearless	1	Duke	1
Great Eastern	2	Eva	1	Duke of Sutherland	2
Green Walnut	1	Gipsy Queen	2	Eagle	2
Highlander	2	Golden Lion	1	Early Green Hairy	2
Lord Audley	2	Green Hedgehog	1	Foreman	1
Lord Derby	2	Hastenwell	1	Forester	1
Lord Rancliffe	2	John Anderson	1	Freedom	1
Magistrate	1	Langley Gage	2	Garibaldi	2
Mayor of Oldham	1	Langley Beauty	1	General	2
Major Hibbert	1	Leveller	2	Goliath	1
Nottingham	2	London City	2	Gretna Green	2
Oldham	1	Lord Scarborough	2	Greenock	1
Overseer	3	Matchless	1	Green Laurel	1
Pretty Boy	1	Nonpareil	1	Hannah	1
Random Green	2	Napoléon le Grand	1	Highlander	1
Rough Red	1	Monarch	1	High Sheriff	2
Ringer	1	Peru	2	Ironmonger	2
Slaughterman	2	Pilot	2	Jenny Lind	1
Sunset	1	Pitmaston Greengage	2	Jenny Jones	2
Surprise	2	Ploughboy	1	Keen's Seedling	2
Telegraph	1	Progress	1	Keepsake	1
		Railway	2	King of Trumps	2
		Rifleman	2	Lady Leicester	2
		Scotch Nutmeg	1	Lancashire Lad	3
		Rumbullion	1	Lancashire Gunner	1
		Rosebery	2	Lady Haughton	2
		Shiner	1	Langley Green	2
		Scotch Red Rough	1	Leader	4
		Snowdrift	2	London	3
		Succeed	2	Leviathan	1
		Stella	2	Magenta	1
		Souter Johnny	1	Monarch	1
		Superb	2	Mitre	1
		The Pet	2	Marlborough	1
		Talfourd	1	Mount Pleasant	2
		Thumper	1	Ostrich	1
		The Lion	2	Philip I.	1
		Yellowball	2	Queen of Trumps	2
				Red Robin	1
				Stockwell	1
				Speedwell	1
				Snowdrop	1
				Transparent	1
				Tom Joiner	2
				Trumpeter	1
				Traveller	2
				Warrington	2
				Weatherproof	2
				Whinham's Industry	2
				Whitesmith	2
				Wonderful	1
				Yellowsmith	2

It was perhaps those varieties worst attacked by the mildew that dropped their leaves worst as a rule, but there were exceptions, as TABLE III. shows.

The progress of the disease was not very marked for a little time after the spraying, partly because there was nothing to attack in some cases, but as soon as growth commenced again on the defoliated shoots, the mildew again spread rapidly. A third spraying was carried out with lime-sulphur wash, having a specific gravity of 1·005, and again the effect upon the foliage was most marked. Table II. shows the varieties which lost their leaves under this spraying.

TABLE II.—EFFECT OF SPRAYING WITH LIME-SULPHUR ON GOOSEBERRIES AT WISLEY, JULY 11, 1913.

Varieties losing many leaves.	Varieties losing some leaves.
Beauty	Australia
Champagne Red	Berry's Early Kent
Crown Bob	Bobby
Glenton Green	Careless
Golden Lion	Champagne White
Great Eastern	Clayton
Green Hedgehog	Coppice Lass
Green Walnut	Cramp
Hastenwell	Crown Bob
Highlander	Golden Gem
Lancashire Gunner	King of Trumps
Langley Beauty	Lady Haughton
Langley Gage	Leveller
Leviathan	London
Major Hibbert	London City
Rough Red	Nottingham
Slaughterman	Random Green
Speedwell	Shiner
Stella	Superb
The Lion	Talfourd
Thumper	Traveller
Yellowball	

NOTE.—Some of the varieties not named were still defoliated from the liver of sulphur spraying (compare TABLES I. and III.)

The spraying appeared to check the mildew for a short time, but not to kill the fungus completely, so that it subsequently recovered and spread still further.

TABLE III. shows a list of varieties which were not affected by the spraying either with the liver of sulphur or lime-sulphur sprays. It also shows the varieties in the collection which were least badly attacked by the mildew. No variety seems to have escaped attack completely.

TABLE III.—VARIETIES OF GOOSEBERRY UNAFFECTED BY SPRAYING WITH LIVER OF SULPHUR OR LIME-SULPHUR AT WISLEY, 1913.

Variety.	Attack of Mildew.	Variety.	Attack of Mildew.
*Alma	v. slight	Jenny Jones	bad
Bayslate Hero	,,	Jenny Lind	v. ,,
Bollin Hall	v. ,,	Keen's Seedling	v. slight
British Queen	,,	*King of Trumps	v.v. ,,
Broom Girl	,,	Lancashire Lad	,,
Candidate	v. ,,	Leader	v.v. ,,
*Careless	,,	*Lord Scarborough	,,
Catherina	v. ,,	*Matchless	v.v. ,,
Coiner	v. bad	Mitre	,,
*Coppice Lass	v. ,,	Monarch	,,
Crystal	v.v. ,,	Mount Pleasant	v. ,,
*Drill	,,	*Napoléon le Grand	v. ,,
Duke	,,	*Peru	v.v. ,,
Duke of Sutherland	v. ,,	Philip I.	,,
Duster	,,	*Progress	v.v. ,,
Eagle	v. ,,	Queen of Trumps	v.v. ,,
Early Green Hairy	v.v. ,,	*Rifleman	v.v. ,,
Foreman	v. ,,	*Rosebery	v.v. ,,
Forester	,,	Snowdrop	v. ,,
Freedom	,,	*Stockwell	v.v. ,,
Garibaldi	v. ,,	Succeed	,,
General	v.v. ,,	*Tom Joiner	,,
*Gipsy Queen	v. ,,	Trumpeter	,,
Goliath	,,	Warrington	,,
Green Laurel	v. ,,	Whinham's Industry	,,
Greenock	,,	Whitesmith	v. ,,
Gretna Green	,,	Wonderful	bad
High Sheriff	v ,,	Yellowsmith	,,
Ironmonger	v.v. ,,		

* These varieties dropped a few leaves.

BAXTER and SALMON† have already pointed out that 'Whinham's Industry' may be sprayed with fairly strong spraying materials under any weather conditions, whereas 'Berry's Early Kent' is far more susceptible of injury, especially when hot weather occurs during or soon after the operation. In 1912 Messrs. SALMON and WRIGHT ‡ found 'Whinham's Industry,' 'Rifleman,' 'Warrington,' and 'May Duke' were uninjured by a spray twice the strength of that used at Wisley, and 'Lancashire Lad' by a spray of the same strength. 'Crown Bob' and 'Berry's Early Kent' were injured by the later

† BAXTER, D. E., and SALMON, E. S., "Spraying Experiments with the Lime-Sulphur Wash on Gooseberries," *Journal S.E. Agr. Coll.* 1911.

‡ SALMON, E. S., and WRIGHT, C. W. B., "Lime-sulphur Wash for American Gooseberry Mildew," *Journal Bd. Agr.* xix. (1913), p. 994.

sprayings, and 'Valentine's Seedling' and 'Yellow Rough' were badly damaged even by the early sprayings. Our results confirm these and were obtained in a very different season. Thus it appears unsafe to spray many varieties of gooseberries with either lime-sulphur or liver of sulphur, and neither spray proved effective in combating the disease under the conditions of the work at Wisley, although both checked it for a time. The defoliation is not only a source of loss of food-making power in the plants but it also excites the lateral buds into growth, thus further tending to weaken the bushes. Probably lime-sulphur would protect bushes from infection where it can be safely applied.

It is a pleasant duty to acknowledge the assistance of the Wisley students, especially of Messrs. J. O. PRITCHARD, C. C. TITCHMARSH, and A. N. RAWES, in carrying out the spraying and in making the observations here recorded.

The weather conditions during the spraying and after are set out in Table IV.

TABLE IV.—WEATHER CONDITIONS AT WISLEY DURING SPRAYING OPERATIONS, 1913.

Date.	Temperature.		Hours of Bright Sunshine.	Rainfall in inches.	Date.	Temperature.		Hours of Bright Sunshine.	Rainfall in inches.
	Max.	Min.				Max.	Min.		
May 7	55·2	34·9	4·9	·08	June 25	66·4	48·9	4·5	—
* ,, 8	52·7	46·8	—	·11	,, 26	68·8	49·9	8·2	—
* ,, 9	56·1	47·7	·2	·01	,, 27	65·7	50·7	9·8	—
,, 10	60·3	46·1	12·2	—	,, 28	76·2	43·3	9·5	—
,, 11	62·2	39·0	7·5	·01	,, 29	78·2	52·1	14·2	—
,, 12	58·1	43·2	—	·05	,, 30	73·0	49·0	5·2	—
,, 13	67·7	51·0	7·0	—	July 1	70·2	49·3	8·8	—
,, 14	65·2	42·0	5·9	—	,, 2	71·2	53·0	6·7	·12
,, 15	59·1	45·0	6·9	—	,, 3	66·8	55·4	4·8	—
,, 16	64·2	43·0	8·8	—	,, 4	68·9	51·0	1·1	trace
,, 17	69·6	38·2	11·1	—	,, 5	65·6	51·9	1·0	·07
,, 18	58·5	41·1	12·8	—	,, 6	62·0	50·2	1·0	·07
,, 19	57·2	37·8	10·1	·05	,, 7	62·8	48·6	4·7	—
,, 20	62·2	39·5	3·2	trace	,, 8	63·7	42·9	4·8	—
,, 21	62·7	46·8	5·7	—	,, 9	64·1	46·0	1·5	·06
.	. .	. .	. .	. .	,, 10	63·3	54·0	—	·03
†June 12	62·2	48·9	2·2	—	,, 11	67·1	49·8	5·7	—
,, 13	63·3	50·2	·6	—	,, 12	73·6	50·3	4·8	—
,, 14	68·3	53·4	3·8	—	,, 13	67·1	52·3	1·4	—
,, 15	76·9	52·4	13·9	—	,, 14	72·6	50·9	2·4	·72
,, 16	83·7	45·0	12·8	—	,, 15	61·1	51·8	—	·25
,, 17	82·4	53·7	9·5	—	,, 16	69·2	53·7	3·7	—
,, 18	75·2	49·8	6·1	—	,, 17	70·1	52·0	3·7	·26
,, 19	68·8	53·9	11·6	trace	,, 18	68·1	57·9	1·1	trace
,, 20	64·3	47·9	1·4	·34	,, 19	62·1	51·8	—	·09
,, 21	67·2	45·9	4·4	—	,, 20	66·9	56·5	12·8	—
,, 22	73·2	46·2	10·0	—	,, 21	63·3	45·4	·3	·01
,, 23	64·3	50·7	2·9	·02	,, 22	65·9	54·9	3·3	trace
,, 24	62·1	49·6	1·5	—					

* First spraying.

† Second spraying spread over fortnight as fruit was picked. Done only on dull days.

XVIII.—ON BEANS DAMAGED BY BEETLES.

By F. J. Chittenden, F.L.S.

In some seasons a considerable quantity of the seed of broad beans offered for sale is found to be damaged by a boring beetle (*Bruchus rufimanus*, Boh.), often wrongly called the bean weevil. The beetle is not a weevil, and as a true weevil (*Sitones lineatus*) is often found attacking the bean foliage it would be better to call this the "bean-seed beetle." The beetle is too well known to need description here. Its eggs are laid in the bean flowers or on the very young pods The larvæ, when hatched, bore through the pod into the seed and feed there, where the beetle also hibernates. The larvæ rarely do any noticeable damage up to the time the seeds are ready for table, but during ripening burrows of a considerable size are made, though the larvæ seem to avoid piercing the testa. In spring, or earlier if the beans are stored in a warm place, the beetles emerge and the exit holes are very noticeable.

The question often arises whether the damaged seeds may be sown with a prospect of reaping a crop. It would manifestly be unwise to sow the beetles as well as the seeds, and there is unfortunately considerable danger of doing so, with the certainty that the next year's crop will be affected. It is not very difficult to destroy the beetles. The sample of seeds attacked should be placed in a vessel which can be hermetically closed. A hole should be bored in the top of the vessel. Immediately beneath it should be suspended a wide-mouthed basin. After the beans are placed in the vessel and the latter closed with the exception of the hole at the top, carbon-bisulphide is poured into the basin at the rate of 3 lb. to each one thousand cubic feet of space in the vessel and the hole immediately closed with a cork. The vessel remains closed for about forty-eight hours, when, if it has been in a warm place, the beetles will be found to be dead.

The seeds of certain varieties of beans seem always to be attacked. It is, for instance, very unusual to see a sample of 'Aquadulce' free from the pest, and this is not altogether the seedsman's fault. He may perhaps be called upon to destroy the beetles before he parts with the seed, but it is at present not infrequently beyond his power to secure seeds free from beetle attack.

Our own experience had led us to believe that seeds so attacked gave as good results as those free from the trouble. The larvæ instinctively avoid damaging the radicle and plumule of the seed in their burrowing. We have never seen either damaged by them in the broadbean. Though they consume a considerable quantity of the

reserve food stored in the cotyledons for the use of the young plant, that store is so great that a certain amount of it can be spared.

In order to test the question more exactly, equal numbers (200 of each set) of broad bean seeds were counted out, one set having been attacked by the beetles, the other being undamaged.* These were sown in boxes under similar conditions and kept side by side. As might have been expected, the damaged seeds germinated two or three days in advance of the whole ones. The holes made by the beetles admitted water more freely than the testa could, and the beans were therefore more quickly in a condition to grow. Equal percentages of the two lots germinated, and the plants first up maintained a slight lead.

Later they were planted out, and both sets attained an equal height, bore remarkably well, and were quite indistinguishable from one another.

It seems, therefore, that seeds damaged by the bean-seed beetle may be used with good hope of reaping a crop provided the beetles are first killed. The only danger is that, if the weather is cold and the seed is very long in germinating, decay may set in, for bacteria and fungi will have easy access through the wounded testa; but under normal conditions there is little to fear.

* The seeds, which were of an unknown but prolific variety, had been grown at Wisley in 1912. They were badly attacked by the beetle, but it is interesting to note that a large number of the beetles had been destroyed by an ichneumon which hatched out at the time the beetles were to be expected. Seeds which had contained perfect beetles were chosen.

VIOLAS AT WISLEY, 1913.

THREE HUNDRED AND SIXTY-EIGHT stocks of Violas in 276 varieties were sent in for trial, some in the autumn of 1912, the rest in the spring of 1913. All were planted in deeply-dug soil in which plenty of leaf mould had been incorporated, and all made capital growth, flowering profusely all through the hot weather of June and July and afterwards. Those planted in the autumn began flowering in February, and were not only the finest plants, but gave the best display all through the year, proving that on such a light soil as that at Wisley autumn planting gives the best results.

A list of Violas planted in autumn 1911 or in spring 1912 is also given. These plants stood for two seasons on the same site undisturbed with the object of testing the hardiness or otherwise of different varieties, as all Violas are not hardy. All are enumerated below, and it will be seen how much they vary in hardiness and vigour after standing two years. The winter of 1912–13 was very trying, as it was so wet, making it an excellent test.

A.M. = Award of Merit.

XXX = Highly Commended.

1. Accushla (*McKee.*—Forbes).*—See vol. xxxviii. p. 275. Height 10 inches.

2. Admiral of the Blues (*J. P. Robertson.*—Dobbie, Forbes, Turner), **A.M.** June 5, 1913.—A vigorous grower of free-flowering habit, with medium foliage and large violet-purple rayless flowers.

3. Agnes (Staward).—See vol. xxxviii. p. 275. Height 14 inches.

4. Agnes Kay (*Kay.*—Dickson, Dobbie), **A.M.** June 5, 1913.—A good, free-flowering variety of spreading habit, with large foliage, and big flowers having the lower and side petals white edged with pale violet-blue, while the upper petal is almost wholly violet-blue. Faintly rayed. Height 11 inches.

5. Ailsa (*McKnight.*—Dobbie).—A very pretty variety, with medium flowers and small foliage. The blooms are bronze-yellow, edged with a pale shade of plum-violet, upper petals lighter; rayed. Height 9 inches.

6. Ajax (Dickson).—See vol. xxxviii. p. 275. Height 14 inches.

7. A. J. Rowberry (*McLeod.*—Dickson), **A.M.** June 25, 1895.—See vol. xxxviii. p. 275. Height 1 foot.

* The names in italics in parentheses are those of the raisers, those in roman letters the names of the senders to the trials. We are deeply indebted to Mr. W. CUTHBERTSON, J.P., F.R.H.S., for drawing up this list of raisers. In some cases it has not been possible to ascertain the raiser's name.

8. Alexandra (*Grieve.*—Dobbie, Turner, G. Wood), **A.M.** June 5, 1913.—A vigorous grower, of nice compact habit. Flowers large, sulphury-white; rays blue; margins prettily crinkled; exceptionally free-flowering. Height 11 inches.

9. Annie S. Frater (*Frater.*—Dickson, Dobbie).—The flowers of this variety are rayless, large, sulphury-white in colour, and have a pretty crinkled pale violet-purple margin. The plant is a vigorous grower, with long lanceolate leaves and rather straggling habit. Height 10 inches.

10. Arabella (*Forbes.*—Forbes).—See vol. xxxviii. p. 275. Height 1 foot.

11. Archie Grant (*Downie.*—Dickson, Dobbie, Forbes, Turner), **A.M.** July 11, 1899.—See vol. xxxviii. p. 275. Height 1 foot.

12. Ardwell Gem (*Fraser.*—Dickson, Turner).—A strong spreading grower, with medium foliage. The flowers are rayed and are of a rich clear lemon-yellow colour. Height 10 inches.

13. Ariel (*Dicksons*—Forbes).—See vol. xxxviii. p. 276. Height 10 inches.

14. Ascot (Staward).—Flowers deep violet-purple, rayed, medium-sized. Habit compact and free-flowering. Height 1 foot.

16. Aurora (Forbes).—A vigorous spreading variety, with medium foliage and flowers of rich dark purple. Height 1 foot.

17. Bertina (Staward).—The flowers of this variety are of medium size, rich pansy-violet in colour, becoming bluer in the centre. Foliage large; habit vigorous. Height 1 foot.

18. Bessie (*Sydenham.*—Dickson, Turner), **A.M.** July 26, 1912.—See vol. xxxviii. p. 276. Height 10 inches.

19. Bethea (*Gold.*—Dobbie), **A.M.** June 5, 1913.—This is one of the best for bedding purposes, being of dwarf compact habit, with medium foliage. The plants produce a mass of sulphury-white rayed blooms of good form on stiff stems. Height 1 foot.

20. Blanche (*Sydenham.*—Forbes).—See vol. xxxviii. p. 276. Height 8 inches.

21. Blue Bell (*Dicksons.*—Forbes, Staward).—See vol. xxxviii. p. 276. Height 11 inches.

22. Blue Bonnet (Forbes).—See vol. xxxviii. p. 276. Height 6 inches.

23. Blue Cloud (*Baxter.*—Dickson, Dobbie, Turner, B. Wood).—See vol. xxxviii. p. 276. Height 8 inches.

24. Blue Duchess (*Dobbie.*—Dobbie, Turner), **A.M.** June 5, 1913.—A very free-flowering and attractive bedder, of nice compact habit, raised by Messrs. Dobbie. The flowers are large, pale violet, rayed. The foliage is of medium size. Height 8 inches.

25. Blue Gown (*Dr. Stuart.*—Dickson, Forbes), **A.M.** July 5, 1897.—See vol. xxxviii. p. 276. Height 8 inches.

26. Bluejacket (Hayward).—A variety of *V. gracilis*, of weak habit and shy in flowering. Flowers, dark bluish-violet purple, rayed. Foliage narrow. Height 6 inches.

27. Blue King (*Nicol.*—Forbes).—See vol. xxxviii. p. 276. Height 11 inches.

28. Blue Rock (*Sydenham.*—Dobbie).—See vol. xxxviii. p. 276. Height 1 foot.

29. Blue Stone (*Dicksons.*—Dickson).—See vol. xxxviii. p. 276. Height 10 inches.

30. Bridal Morn (Dickson, Turner), **A.M.** June 5, 1913.—This is probably one of the best blues yet introduced. It is a strong grower, and has large fragrant flowers of a pale violet-purple shade, becoming bluer in the centre. Height 1 foot.

31. Bridegroom (*Forbes.*—Forbes).—See vol. xxxviii. p. 276. Height 10 inches.

32. Bronze Kintore (*Dobbie.*—Dobbie, Forbes).—See vol. xxxviii. p. 277. Height 8 inches.

33. Bullion (*Dicksons.*—Dickson, Dobbie, Forbes, G. Wood), **XXX** July 5, 1898.—See vol. xxxviii. p. 277. Height 1 foot.

34. Bute (Turner).—For description see 'Bute Yellow,' with which this variety is identical. Height 1 foot.

35. Bute Yellow (Forbes).—See vol. xxxviii. p. 277. Height 1 foot.

36. Buxton Blue (G. Wood).—Habit dwarf and compact; leaves large; flowers medium, lobelia-blue, becoming steel-blue in the centre, rayed. Height 6 inches.

38. Campbell Bannerman (*Robertson.*—Forbes).—See vol. xxxviii. p. 277. Height 15 inches.

39. Cecilia (Forbes, Turner).—See vol. xxxviii. p. 277. Height 11 inches.

40. C. F. Wilson (Staward).—A pretty variety, having a good compact habit. The flowers are sulphury-white and very faintly rayed. Those on four of the six plants sent in had a suffusion of Parma violet over the ground colour. Height 10 inches.

41. Charles B. Murray (*Kay.*—Dobbie).—See vol. xxxviii. p. 277. Height 10 inches.

42. Charles Jordan (*Dobbie.*—Dobbie).—See vol. xxxviii. p. 277. Height 9 inches.

43. Charles Traill (*Forbes.*—Forbes).—See vol. xxxviii. p. 277. Height 1 foot.

44. Charlotte Chambers (*Forbes.*—Forbes).—See vol. xxxviii. p. 277. Height 10 inches.

45. Clara (Staward).—Habit compact; foliage large; flowers medium, sulphury-white, rayed with steel-blue. A free-flowering variety. Height 10 inches.

46. Colonel Plumer (*Sydenham.*—Dickson).—See vol. xxxviii. p. 277. Height 1 foot.

47. *compacta alba* (Forbes).—This is one of the miniature varieties and is of very dwarf and compact habit. The flowers are small, rayless, and of a very pale heliotrope colour. Height 7 inches.

48. Coronation (*Johnstone.*—Dobbie).—A vigorous grower, of

spreading habit, with very large leaves. Flowers very fine, deep purple in colour. The upper petals are lighter. Height 14 inches.

49. Councillor Waters (*Sydenham.*—Dickson, Dobbie, Forbes, Turner), **A.M.** July 18, 1905.—See vol. xxxviii. p. 277. Height 10 inches.

50. Countess of Hopetoun (*Downie.*—Dobbie, Forbes), **XXX** August 16, 1898.—See vol. xxxviii. p. 277. Height 10 inches.

51. Countess of Kintore (*Downie.*—Dobbie).—See vol. xxxviii. p. 277. Height 18 inches.

52. Crimson Bedder (Dickson, Dobbie).—See vol. xxxviii. p. 278. Height 10 inches.

53. Crimson King (G. Wood).—A very fine deep purple variety, with large foliage and medium flowers. Habit vigorous and spreading. Height 1 foot.

54. Cynthia (Forbes).—See vol. xxxviii. p. 278. Height 1 foot.

55. Dagon (*Grieve.*—Dobbie).—A good bronze variety, of compact habit, with medium foliage and large flowers. The centre of the bloom is very dark mahogany-brown, becoming lighter towards the margins, where traces of plum-violet are noticeable. Height 1 foot.

56. Dairymaid (B. Wood).—Habit dwarf and compact; foliage small; flowers medium, deep lavender-blue with amber-white centre, faintly rayed. The colour becomes light violet-purple with age. Height 1 foot.

57. Darkness (Hayward).—A remarkable *gracilis* hybrid, suitable for the rock garden. The flowers are very dark violet in colour, and, casually examined, appear to be almost black. The plant is a vigorous grower and flowers very abundantly. It spreads rapidly and has very narrow foliage. Height 1 foot.

58. Dobbie's White Bedder (*Dobbie.*—Dobbie).—See vol. xxxviii. p. 278. Height 9 inches.

59. Dorothy (Morter).—This is apparently identical with the variety 'Queen's Park.' Height 6 inches.

60. Duchess of Argyle (Dobbie).—A vigorous spreading variety, of free-flowering habit. Flowers medium, lower petals pale amber white with an irregular margin of rich pansy violet, which is the predominating colour of the upper petals. Rays deep blue. Height 10 inches.

61. Duchess of Cleveland (Hayward).—A charming hybrid between *V. gracilis* and *V. cornuta.* It is a very vigorous and spreading grower, and is exceptionally free-flowering. The flowers are medium in size, violet-purple shading to lavender-blue at the extremities of the petals. Suitable for the rockery. Height 1 foot.

62. Duchess of Fife (*Baxter.*—Dickson, Forbes, Turner), **XXX** August 2, 1892.—See vol. xxxviii. p. 278. Height 10 inches.

63. Duchess of Sutherland (*Downie.*—Forbes).—See vol. xxxviii. p. 278. Height 10 inches.

64. Duchess of York (Dobbie).—See vol. xxxviii. p. 278. Height 10 inches.

65. Duke of Argyle (Dobbie).—A strong-growing variety, of spreading habit, with large leaves. The flowers are large and of a rich dark purple colour, with lighter upper petals. They are borne very profusely on stiff erect stems. Height 10 inches.

66. Edina (*Taylor.*—Dobbie, Turner), **A.M.** July 26, 1912.—See vol. xxxviii. p. 278. Height 1 foot.

67. Edwin Molyneux (*Forbes.*—Forbes).—See vol. xxxviii. p. 278. Height 15 inches.

68. Elsa (Hayward).—A pretty *gracilis* hybrid, of vigorous growth and spreading habit. It is very free-flowering. The flowers, which are narrow, are of a rich pansy-violet colour, which fades away in the upper petals. Height 1 foot.

69. Eminence (*Forbes.*—Forbes).—See vol. xxxviii. p. 278. Height 1 foot.

71. Felix (Hayward).—A very charming *gracilis* hybrid, vigorous and spreading in growth. The foliage is lanceolate in shape, and the rayed flowers, which are produced very freely, are bluish violet-purple in colour. The plant is quite dwarf in habit and admirably adapted for the rock garden. Height 1 foot.

72. Flodden (*Grieve.*—Dobbie).—Habit compact and free-blooming; flowers medium, bronze edged with plum-violet. Height 11 inches.

73. Florizel (*Dr. Stuart.*—Dobbie, Forbes, G. Wood).—See vol. xxxviii. p. 278. Height 1 foot.

74. Forget-me-not (Dickson).—A small-flowered variety, of compact habit, with small foliage. The flowers are light bluish-violet, with sulphury-white centre, rayless. A shy-flowering variety. Height 10 inches.

75. Fred Williams (*Forbes.*—Forbes), **A.M.** June 5, 1913.—This variety has a nice habit of growth and medium foliage. The flowers are of good shape, flat, and of medium size. They are pale violet-purple in colour, with prettily crinkled margins. Height 6 inches.

76. General Baden-Powell (*Kay.*—Forbes).—A rather weak grower, with deep golden-yellow rayless flowers of medium size. Height 8 inches.

77. George Callan (*Johnstone.*—Dobbie).—Flowers large, rich pansy-violet, mottled with lighter shades. The plant is free-flowering and a vigorous grower, with medium foliage. Height 1 foot.

78. George C. Murray (*Kay.*—Dobbie, Forbes, Staward).—See vol. xxxviii. p. 279. Height 9 inches.

79. George Dunn (Dobbie).—The flowers of this variety are large and of a purple colour, marbled with lighter shades. They are borne on very stiff stems, and the plant is vigorous and spreading in growth. Height 1 foot.

80. George Palmer (Forbes).—See vol. xxxviii. p. 279. Height 10 inches.

81. Gertie (*Forbes.*—Forbes).—See vol. xxxviii. p. 279. Height 11 inches.

82. Glencoe (*Grieve.*—Dobbie, Forbes, G. Wood).—A weak grower

and a shy bloomer, with small foliage. The flowers are a rich bronze, shading off to yellow-lake towards the margins. Height 11 inches.

83. Glow (*Dicksons.*—Dickson).—See vol. xxxviii. p. 279. Height 10 inches.

84. Golden Fleece (Wallace).—A pretty variety of *V. gracilis*, having pale primrose-yellow flowers, rayed with brown. The lower petal is a little deeper in colour. Height 6 inches.

85. Goldfinch (*Baxter.*—Dobbie).—A Pansy of vigorous growth, with big lanceolate leaves and deep chestnut-brown flowers, edged with golden yellow. Height 1 foot.

86. Goldfinder (Staward).—A strong straggling grower, with medium deep clear yellow-rayed flowers. Free-flowering in habit. Height 1 foot.

87. Gondolier (Hayward).—A charming free-flowering hybrid between *V. gracilis* and *V. cornuta*. The leaves are ovate, and the plant is a strong and spreading grower. The flowers, which are larger and rounder than those of *V. cornuta*, are amber-white and rayless, while the lower petal is tinged with chrome-yellow. Height 8 inches.

88. Grace (Staward).—Habit neat and compact, with medium foliage. Flowers sulphury-white, rayless, upper petals suffused with very pale ageratum blue. Height 11 inches.

89. *gracilis* (Wallace), **A.M.** March 31, 1908.—A remarkably pretty dwarf species, producing an abundance of deep purple blossoms in dense tufts. The spur of the flower is somewhat curved and is about as long as the corolla. The leaves are linear lanceolate and acute. The plant, which is a native of Mount Olympus, grows about 4 inches high, and commences to bloom early in the spring and continues for a long period. Height 8 inches.

90. Grievei (*Grieve.*—Dobbie).—A variety of strong and spreading habit, with medium foliage and flowers. Colour yellow, rayed. Height 1 foot.

91. Grievei Improved (*Grieve.*—G. Wood).—Similar to the preceding.

92. Grove Lodge (Turner).—Habit compact, dwarf and free flowering. Flowers medium, light violet-purple, paler in the centre, rayless. Height 10 inches.

93. Harry Hamilton (Turner).—This variety is very similar to 'Kate Cochrane,' but the flowers are somewhat smaller. Colour dark purple, shading off almost to white in the upper petals. Height 1 foot.

94. Hector MacDonald (Dickson, Dobbie).—See vol. xxxviii. p. 279. Height 10 inches.

96. Holyrood (*Dicksons.*—Forbes).—See vol. xxxviii. p. 279. Height 11 inches.

97. Hugh Reid (*Johnstone.*—Dobbie).—A very pretty flower, of large size. Colour deep purple, shading to pale violet-rose in the upper petals. Habit strong and spreading; foliage medium; flower stems very stiff and erect. Height 16 inches.

98. Iris (Hayward).—A charming *gracilis* hybrid of strong growth,

with violet-purple flowers, fading almost to white in the upper petals and at the tips of the side petals. Height 8 inches.

99. Isolde (Dobbie).—**A.M.** July 18, 1905.—Habit very vigorous and free-flowering; growth tall; leaves medium; flowers medium, rayless, deep golden yellow. Height 16 inches.

100. Ithuriel (Dobbie, Turner).—See vol. xxxviii. p. 279. Height 1 foot.

101. Ivanhoe (*Forbes.*—Forbes).—See vol. xxxviii. p. 279. Height 14 inches.

102. Jackanapes (Forbes), **A.M.** July 11, 1899.—Flowers deep yellow, rayed, upper petals chestnut-brown, very pretty. The plant is not a strong grower. Height 9 inches.

103. James C. Erskine (Forbes).—See vol. xxxviii. p. 279. Height 7 inches.

104. James M. Grier (*McFadyen.*—Dobbie).—A large-flowered variety, of strong growing habit. Colour deep violet-purple, shading off to ageratum-blue at the margins of the petals. Height 8 inches.

105. James Pilling (Forbes, Turner, G. Wood).—See vol. xxxviii. p. 279. Height 10 inches.

106. J. B. Riding (*McLeod.*—Dickson, Forbes, Turner), **A.M.** July 11, 1899.—See vol. xxxviii. p. 279. Height 13 inches.

107. Jean Craik (Dickson).—See vol. xxxviii. p. 279. Height 1 foot.

108. Jenny Houston (Dobbie).—See vol. xxxviii. p. 280. Height 9 inches.

109. Jenny M'Call (*Dobbie.*—Dobbie).—A strong grower, with medium foliage and large flowers of a rich dark purple colour. The upper petals shade off to pale violet-purple, and the plant is very free-flowering in habit. Height 14 inches.

110. Jenny McGregor (*Kay.*—Dobbie).—Habit straggling, flowers medium, rayless, rich pansy-violet, shading off to light bluish-violet at the margins, especially in the upper petals. Height 11 inches.

111. Jessie (Morter).—This is a seedling from 'J. Pilling,' of nice compact habit, with medium foliage. The flowers are medium in size, amber-white, suffused with pale violet-purple, more especially in the upper petals. Height 10 inches.

112. Jessie Baker (*Bakers.*—Turner).—A strong grower, with medium foliage and free-flowering habit. Flowers medium, sulphury-white edged with violet-purple, rayless, of good form. Height 13 inches.

113. Mrs. J. H. Rowland (Turner).—Growth strong, habit compact, flowers large, pale magenta, lightly rayed; foliage small. Height 1 foot.

114. J. H. Watson (Dobbie).—The flowers of this variety are large, rich deep purple, mottled with lighter shades. A strong grower, of free-flowering habit. Height 11 inches.

115. Joan (Staward).—Flowers sulphury-white, rayed; upper petals suffused with very pale violet-purple, lower petals edged with

the same. Habit compact, growth strong, foliage medium. Height 1 foot.

116. John (Staward).—A free-flowering variety with medium-sized rich dark purple flowers. Habit compact, foliage medium. Height 1 foot.

117. John Cunningham (*Dobbie.*—Dobbie).—A rayless variety having a pale heliotrope ground, suffused with rich pansy-violet. Habit weak and straggling. Height 14 inches.

118. John Forbes (*Forbes.*—Forbes).—See vol. xxxviii. p. 280. Height 1 foot.

120. John Quarton (Dickson, Forbes, Turner), **A.M.** July 26, 1912. —See vol. xxxviii. p. 280. Height 10 inches.

121. John Young (Forbes).—Habit compact, with large leaves. Flowers large, faintly rayed, violet-purple. This is not a free-flowering variety. Height 8 inches.

122. Jubilee (Dobbie), **A.M.** July 26, 1912.—See vol. xxxviii. p. 280. Height 16 inches.

123. Kate Blyth (Dickson).—See vol. xxxviii. p. 280. Height 10 inches.

124. Kate Cochrane (Dobbie).—See vol. xxxviii. p. 280. Height 13 inches.

125. Katie (Staward).—A vigorous grower, with medium foliage and free-flowering habit. Flowers pale sulphur-yellow, lower petal golden yellow, faintly rayed with pale aniline-blue. Stock mixed. Height 13 inches.

126. Kingcup (*Sydenham.*—Dickson, Dobbie, Forbes, Turner, G. Wood), **A.M.** July 26, 1912.—See vol. xxxviii. p. 280. Height 13 inches.

127. Kitty Bell (Dickson, Dobbie, Forbes).—See vol. xxxviii. p. 280. Height 14 inches.

128. Klondyke (*Dr. Dickson.*—Dobbie).—See vol. xxxviii. p. 280. Height 13 inches.

129. Lady Clonbrook (B. Wood).—A strong grower, of compact and very free-flowering habit. Foliage small; flowers medium, vinous mauve, becoming lighter in the centre, faintly rayed. Height 15 inches.

130. Lady Grant (*Frater.*—Dickson, Dobbie, Forbes).—See vol. xxxviii. p. 280. Height 13 inches.

131. Lady Knox (*Frater.*—Dobbie).—This variety is tall and vigorous, with medium lanceolate leaves and a very free-flowering habit. Flowers large, rayless, clear primrose-yellow; very pretty. Height 14 inches.

132. Lady of the Snows (*Robertson.*—Forbes).—See vol. xxxviii. p. 280. Height 10 inches.

133. Lark (*Sydenham.*—Dickson, Dobbie).—See vol. xxxviii. p. 280. Height 11 inches.

134. Larn (Staward).—A free-flowering variety, of vigorous spreading habit, with large foliage. The flowers are large, pale

sulphury-white, suffused in the upper petals with ageratum-blue; rayless. Height 1 foot.

135. Lawmuir (*McFadyen.*—Dobbie).—The flowers of this variety are large, purple, rayed, and the plant is a vigorous and spreading grower, with lanceolate leaves. Height 15 inches.

136. Lilacina (*Dicksons.*—Dobbie).—See vol. xxxviii. p. 281. Height 1 foot.

137. Lilian (*Forbes.*—Forbes).—See vol. xxxviii. p. 281. Height 9 inches.

138. Lizzie Paul (Dickson).—See vol. xxxviii. p. 281. Height 10 inches.

139. Lodge House No. 1 (Woods).—An exceptionally free-flowering variety, bearing medium-sized flowers on stiff stems. The colour is pale ageratum-blue, with heavy steel-blue rays. The plant is a vigorous and spreading grower, with large foliage. Height 14 inches.

140. Lodge House No. 2 (Woods).—A strong grower, of nice compact habit and medium foliage. Flowers large, rich pansy-violet, abundantly produced. Height 14 inches.

141. Lodge House No. 3 (Woods).—Flowers pale sulphur-yellow, rayless, small; foliage small; habit strong and spreading, free-flowering. Height 10 inches.

142. Lodge House No. 4 (Woods).—This variety was weak in growth and bore medium flowers of a violet-purple colour, with bluish-violet centre, faintly rayed. Height 8 inches.

143. Lodge House White (Woods).—A compact grower, of good constitution. Flowers and foliage medium in size; colour pure white, rayless; very free-flowering. Height 8 inches.

144. Lord Elcho (Turner).—A compact grower, with medium foliage and small primrose-yellow rayless flowers. Height 6 inches.

145. Lord Shaw (*G. Wood.*—Dobbie, G. Wood).—A compact and strong grower, with fairly large foliage and violet-purple, rayed flowers of good size, which are borne profusely. Height 11 inches.

146. Lottie McNeil (Turner).—A free-flowering variety, of nice compact habit, with medium lilac-mauve, rayless flowers borne on erect stiff stems. Somewhat like the variety 'Florizel.' Height 9 inches.

147. Lucy Franklin (Turner).—The growth of this variety is rather straggling, but it has a strong constitution. The foliage is large and the flowers are rayless, amber-white in colour, with a buttercup-yellow lower petal. Height 15 inches.

148. Lyric (Forbes).—See vol. xxxviii. p. 281. Height 9 inches.

149. Maggie (Staward).—A sulphury-white rayless variety, of medium size Habit strong, spreading and free-flowering. Height 14 inches.

150. Maggie Currie (Dickson, Dobbie).—See vol. xxxviii. p. 281. Height 11 inches.

151. Maggie Mott (*Burdett.*—Dickson, Dobbie, Turner, G. Wood), **A.M.** July 26, 1912.—See vol. xxxviii. p. 281 Height 15 inches.

152. Maid of Lorn (Dickson).—See vol. xxxviii. p. 281. Height 9 inches.

153. Marchioness (*Irvine*.—Dobbie, B. Wood, G. Wood).—See vol. xxxviii. p. 281. **A.M.** July 27, 1898. Height 14 inches.

154. Margaret Lord (Staward).—A vigorous grower, of spreading habit, bearing deep golden-yellow rayless flowers of medium size. The foliage is large and lanceolate in shape. Height 1 foot.

155. Margaret Wood (*Grieve*.—G. Wood).—A rich chrome-yellow rayless variety, becoming gamboge-yellow in the centre. The flowers and foliage are medium in size, and the habit of the plant is vigorous and spreading. Height 16 inches.

156. Marion Waters (Staward).—This variety is strong and spreading in growth, with medium foliage and pretty pale violet-purple flowers of medium size, which are rayed. The stock contained one rogue bearing large sulphury-white flowers. Height 10 inches.

157. Marjorie (Morter).—A vigorous variety, with large foliage and very pale sulphur-yellow rayless flowers of good size and having crinkled margins. Height 14 inches.

158. Marjorie (Wallace).—A variety of *gracilis* with pale sulphur-yellow flowers rayed with violet. The blooms are smaller than those of the type. Height 6 inches.

159. Mars (*Grieve*.—Dobbie).—This variety is compact in growth and has small leaves. The flowers, which are not produced very freely, are medium in size and bronze in colour, being very deep in the centre and shading off to gamboge-yellow. Height 9 inches.

160. Mary Burnie (*Dobbie*.—Dobbie, Forbes).—See vol. xxxviii. p. 281. Height 9 inches.

161. Masterpiece (B. Wood).—The flowers of this variety are of medium size, chrome-yellow, blotched on the three lower petals with brown, rayed. Height 10 inches.

162. Mauve Queen (*Dobbie*.—Dixon, Dobbie).—See vol. xxxviii. p. 282. Height 14 inches.

163. May (Staward).—A spreading grower, of strong constitution. Flowers amber-white, suffused with heliotrope, rayed, lower petals tinged with deep golden yellow; size medium. Height 10 inches.

164. Mina (*Turner*.—Turner).—The flowers of this variety are small, amber-white, slightly rayed and very freely produced. The plant is a vigorous grower, with medium foliage. Height 14 inches.

165. Minnie J. Ollar (*Ollar*.—Dobbie).—This variety did not make strong growth. Foliage medium, flowers small, primrose-yellow, edged with bright violet-purple; rayed with purple. Height 7 inches.

166. Miranda (Staward).—A strong upright grower, with large foliage and flowers. The latter are very fine in form, rayless, white, tinged at the margins with pale violet-purple, especially in the upper petals. Height 1 foot.

167. Miss Airdrie (G. Wood).—Flowers medium, primrose-yellow, rayless. Foliage medium. Habit vigorous, spreading, and very free-flowering. Height 14 inches.

168. Miss Anna Callan (*Johnstone.*—Dobbie, Turner).—The flowers are amber-white, heavily shaded with bluish-violet and rayed. Messrs. Dobbie's stock was of very compact and tufted growth, with small ovate leaves and few flowers, but the other stock was of normal growth and flowered freely. The compact grower was 8 inches high, while the other was 1 foot high.

169. Miss Michie (*Forbes.*—Forbes).—See vol. xxxviii. p. 282. Height 9 inches.

170. Molly Pope (Dickson).—See vol. xxxviii. p. 282. Height 9 inches.

171. Moseley Perfection (*Bostock.*—Dobbie, Turner), **A.M.** May 9, 1911.—See vol. xxxviii. p. 282. Height 15 inches.

172. Mrs. A. Hervey (*Dobbie.*—Dickson, Dobbie).—A tall grower, with medium foliage. The flowers are medium in size, rayless, white, having the edges and often much of the upper petals mottled with rich pansy-violet. The flower stems are very stiff and erect, and the plant is very free-flowering in habit. Height 13 inches.

173. Mrs. Allsop (*Forbes.*—Forbes).—See vol. xxxviii. p. 282. Height 10 inches.

174. Mrs. B. K. Mitchell (Dickson).—A compact grower, with small foliage and rich pansy-violet flowers of small size, having the centre amber-white and rayed. Height 9 inches.

175. Mrs. C. B. Douglas (Dickson, Dobbie).—See vol. xxxviii. p. 282. Height 11 inches.

176. Mrs. C. F. Gordon (Forbes, Turner).—See vol. xxxviii. p. 282. Height 10 inches.

177. Mrs. Charles Turner (Dobbie), **XXX** July 4, 1893.—See vol. xxxviii. p. 282. Height 1 foot.

178. Mrs. Chichester (*Sydenham.*—Dickson, Dobbie, Forbes, Turner), **A.M.** July 26, 1912.—See vol. xxxviii. p. 282. Height 14 inches.

180. Mrs. Currie (Staward).—The flowers of this variety are rayless and primrose-yellow in colour. The plants have a vigorous, spreading and free-flowering habit, with medium foliage. Height 13 inches.

181. Mrs. Davidson (*Forbes.*—Forbes), **A.M.** July 26, 1912.—See vol. xxxviii. p. 282. Height 1 foot.

182. Mrs. D. M. McKinnon (*Forbes.*—Forbes).—This variety grew very weakly, and produced very small rayless flowers of a pale violet-purple shade. Height 6 inches.

183. Mrs. Dundas (Dobbie).—The flowers of this variety are large and of a rich pansy-violet colour. The plant is a vigorous grower, of spreading habit, and having medium foliage. It has a good constitution and produces its flowers in great profusion. Height 15 inches.

184. Mrs. E. Turnbull (*Dobbie.*—Dobbie).—A vigorous variety, with medium foliage and flowers. The latter are of good form and are of a very dark purple colour, nearly black, with lighter margins. This was the darkest Viola in the trial. Height 9 inches.

185. Mrs. Geo. Wood (*G. Wood.*—G. Wood).—A charming variety, of strong constitution and spreading habit, with medium foliage. It

is exceptionally free-flowering, and bears bright violet-purple flowers of medium size, faintly rayed. Height 15 inches.

186. Mrs. H. Hamilton (*Dobbie.*—Dobbie).—A strong grower, with lanceolate leaves. The flowers are of good form and medium size, sulphury-white in colour, edged with violet-purple, which is suffused through the upper petals; rayless. A very free-flowering variety. Height 1 foot.

187. Mrs. Hopkirk (Grier).—A variety of straggling habit, with medium sulphury-white flowers, rayed with deep purple. Height 9 inches.

188. Mrs. J. Sweeney (Dobbie).—A strong grower, of spreading habit, with large rayless flowers, which are deep purple in the centre, getting lighter towards the margins, where light ageratum-blue is the prevailing colour. Height 14 inches.

189. Mrs. McPhail (Dickson).—Flowers large, pale ageratum-blue, rayed; foliage medium; habit strong and compact. Height 10 inches.

190. Mrs. Norris-Elye (*Dobbie.*—Dobbie).—See vol. xxxviii. p. 283. Height 14 inches.

191. Mrs. Pat (*Robertson.*—Forbes).—See vol. xxxviii. p. 283. Height 1 foot.

192. Mrs. R. A. Boden (*Forbes.*—Forbes).—A weak grower, with medium foliage and golden-yellow rayless flowers. Height 1 foot.

193. Mrs. R. Jones (*Forbes.*—Forbes).—Flowers medium, very light bluish-violet, rayless; habit straggling; not a strong grower. Height 9 inches.

194. Mrs. Scott Elliot (*Forbes.*—Forbes).—See vol. xxxviii. p. 283. Height 10 inches.

195. Mrs. T. W. R. Johnston (*Johnstone.*—Dickson, Forbes).—See vol. xxxviii. p. 283. Height 10 inches.

196. Mrs. Watt-Black (Watt-Black).—A strong-growing variety, of spreading habit, with medium foliage and flowers. Colour bright primrose-yellow, edged with pale heliotrope, which is also much suffused through the upper petals, rayed. Height 1 foot.

197. Mrs. W. Greenwood (Dickson).—This variety has medium-sized rayless flowers of rich chrome-yellow. The habit is strong and spreading, with medium foliage. Height 10 inches.

198. Muriel (B. Wood).—A vigorous grower, with strong constitution and compact habit. The foliage and flowers are large. The latter are of excellent form; sulphury-white, edged with bluish-violet, which predominates in the two upper petals; slightly rayed. Height 1 foot.

199. Nellie (*Sydenham.*—Dickson).—See vol. xxxviii. p. 284. Height 1 foot.

200. Nellie Chapman (*Dobbie.*—Dobbie).—See vol. xxxviii. p. 284. Height 14 inches.

201. Nettie Macfadyen (Dobbie).—Flowers dark purple, with lighter upper petal, rather small. Habit spreading, growth strong. Height 1 foot.

202. Nora Marrows (Dobbie).—A vigorous grower, with lanceolate leaves and medium-sized rayed flowers, borne on very stiff stems. The colour is very pale lilac-mauve, which turns almost white with age. Height 1 foot.

204. Ophelia (*Sydenham.*—Dobbie).—See vol. xxxviii. p. 284. Height 1 foot.

205. Orange (*Grieve.*—Dobbie).—A variety of nice compact habit, with medium foliage. Flowers small, neat, rayed, rich bronze in the centre, shading to gamboge-yellow towards the margins, where a faint tint of plum-violet occurs. Height 11 inches.

206. Oriflamme (*Dicksons.*—Forbes).—A bronze variety, with medium-sized rayed flowers. The plant is a weak grower. Height 9 inches.

207. Oswald (Staward).—A strong grower, having medium foliage. The flowers are identical with those of 'Bethea,' being pale sulphur-yellow, rayed with steel-blue. Height 1 foot.

208. Panshanger White (Staward).—Habit spreading, growth strong; flowers medium, palest sulphury-white, rayless. Foliage medium. Height 14 inches.

209. Panshanger Yellow (Staward).—A dwarf compact variety, with medium foliage and deep golden yellow rayless flowers, which are borne abundantly. Height 10 inches.

210. P. A. Smith (Dickson).—See vol. xxxviii. p. 284. Height 8 inches.

211. Pembroke (*Sydenham.*—Dickson, Forbes).—See vol. xxxviii. p. 284. Height 10 inches.

212. Pencaitland (*Dr. Dickson.*—Dobbie), **A.M.** July 11, 1899.—See vol. xxxviii. p. 284. Height 1 foot.

213. Perdita (*Forbes.*—Forbes).—See vol. xxxviii. p. 284. Height 1 foot.

214. President (*Forbes.*—Forbes).—A rich dark claret-coloured variety of medium size, with medium foliage. Height 1 foot.

215. Primrose (*Forbes.*—Forbes).—See vol. xxxviii. p. 284. Height 1 foot.

216. Primrose Dame (*Sydenham.*—B. Wood).—Flowers medium, primrose yellow; growth strong and spreading, foliage medium. Height 14 inches.

217. Primrose Girl (Hayward).—A *gracilis* hybrid of great vigour with pale sulphur-yellow flowers, rayed with steel-blue and tinged with pale bluish-violet, with which colour the whole flower eventually becomes suffused. The blooms are larger than those of the type, and the plant is especially suitable for the rockery. Height 8 inches.

218. Princess May (Forbes).—See vol. xxxviii. p. 284. Height 8 inches.

219. Purity (*Forbes.*—Dobbie, Forbes, Turner), **A.M.** June 5, 1913.—This useful Viola was raised by Forbes. It has large, rayless, white flowers of great value for bedding. It is very free-flowering, and is strong in growth and spreading in habit. Height 13 inches.

220. Purple Robe (Wallace).—A large deep violet-purple form of *V. gracilis*. It is about twice the size of the type as grown in the trial, and is of exceptionally vigorous and free-flowering habit. The large masses of bloom which it forms would be very effective in the rock garden, for which the plant is admirably adapted. Height 10 inches.

221. Queen of the Whites (Dickson).—A vigorous upright grower, with medium foliage. The flowers are of average size, rayless, and pale sulphury-white in colour. Height 10 inches.

222. Queen of the Year (Dickson, Forbes).—See vol. xxxviii. p. 284. Height 8 inches.

223. Queen's Park (Morter).—A good, deep, clear golden-yellow variety, having medium flowers and large foliage. The plant is of nice, compact habit. Height 7 inches.

224. Redbraes Bronze (*Grieve.*—Dobbie), **A.M.** June 5, 1912.—This is undoubtedly the best of the mahogany or bronze-coloured section. The flowers are of medium size and of a deep mahogany-brown colour, becoming lighter in the upper petals and having a distinct plum-violet margin. It is a good strong grower and is very free-flowering. Height 11 inches.

225. Redbraes White (*Grieve.*—Dobbie), **A.M.** June 5, 1913.—A useful bedder, of large size, and very pale greenish-white in colour. Very free-flowering, compact, and strong in growth. Height 1 foot.

226. Redbraes Yellow (*Grieve.*—Dobbie, Turner, G. Wood), **A.M.** June 5, 1913.—An excellent variety in every way. It is a strong grower, compact, and free-flowering in habit. Flowers deep golden yellow, rayless. Useful for bedding. This and the two preceding varieties were raised by Mr. James Grieve. The stock sent by Mr. Turner was considered to be identical with 'Kingcup.' Height 1 foot.

227. Red Crown (Hayward).—A very pretty hybrid variety, resembling *V. gracilis* in form and size of flower. It is a vigorous grower, of spreading and very free-flowering habit. The flowers are pale sulphur-yellow, rayed with steel-blue, and the upper petals are rich pansy-violet except at the base and margins. Height 15 inches.

228. Reginald (Staward).—A compact grower, with medium-sized ovate leaves. The flowers are sulphury-white, rayless, and have a violet-purple margin. Height 1 foot.

229. Rev. William Young (Grier).—Flowers very large, rich dark purple, very freely produced. Habit compact, vigorous; foliage large. Height 9 inches.

230. Rev. William Young Improved (Grier).—The flowers of this variety are of very fine form and are borne on very stiff stems. Colour rich pansy-violet; habit similar to that of the preceding. Height 1 foot.

231. Robert Barnet (Forbes).—A vigorous spreading variety, with large leaves and flowers. Colour amber-white, with violet-purple and deep chestnut-brown centre. Height 10 inches.

232. Robert Davidson (Staward).—A deep violet-purple variety,

becoming bluer in the centre. The flowers are rayless and of average size. The growth of the plant is strong and straggling. Stock not quite true. Height 16 inches.

233. Rolph (*Sydenham.*—Forbes).—See vol. xxxviii. p. 285. Height 14 inches.

234. Rosy Morn (B. Wood).—A compact grower, having a strong constitution and medium foliage. The flowers are large and are borne on long stems. The colour is a rich pansy-violet. Height 14 inches.

235. Royal Scot (*Grieve.*—Dickson, Dobbie), **A.M.** June 5, 1913.—An excellent variety, raised by Mr. James Grieve. The flowers are of medium size and are deep violet-purple in colour. The plant is a strong, compact grower, of free-flowering habit, suitable for bedding. Height 10 inches.

236. Royal Sovereign (*Stark.*—Dickson, Dobbie, Forbes, Turner), **A.M.** July 18, 1905.—See vol. xxxviii. p. 285. Height 13 inches.

237. Rubella (Hayward).—The habit and foliage of this charming rock-garden variety are like those of *V. gracilis*, but the flowers are fuller and more round in the petals. Colour dark purple; diameter of flower about 1 inch. Height 8 inches.

238. Sir Henry (Staward).—A strong grower, with medium foliage and large, sulphury-white, rayed flowers. Too much like 'Alexandra' to be called distinct. Height 14 inches.

239. Sir Herbert (Staward).—A variety of good, compact habit, with medium foliage. The flowers, which are borne very freely, are pale sulphur-yellow and slightly rayed, while the whole is surrounded by a deep edge of rich pansy-violet, which colour also predominates in the two upper petals. Height 1 foot.

240. Sir Robert Pullar (*Forbes.*—Forbes).—See vol. xxxviii. p. 285. Height 9 inches.

241. Skipjack (*Sydenham.*—Forbes).—Flowers large, violet-purple, curiously marbled with varying shades of bronze. Foliage medium. Height 9 inches.

242. Skylark (*Baxter.*—Turner).—The plant is of nice, compact habit, and bears sulphury-white flowers of medium size, rayed with steel-blue. The upper petals are edged with blue. One plant of 'Mrs. C. F. Gordon' appeared in this stock. Height 9 inches.

243. Small White (Turner).—A vigorous spreading grower, of dwarf habit, with small foliage. The flowers are small, not more than 1¼ inch across, rayless, milk-white, with chrome-yellow centre. They are borne in great profusion. Height 10 inches.

244. Snowdrift (Hayward).—A very pretty variety of the *gracilis* type. The flowers are sulphury-white, with blotches of bright violet-purple on the three lower petals; rayed; with age the whole of the flower becomes suffused with aniline-blue. The plant is of straggling habit. Height 9 inches.

245. Snowflake (*Forbes.*—Dobbie, Forbes), **A.M.** July 26, 1912.—See vol. xxxviii. p. 285. Height 15 inches.

246. Viola Stirling (*Kay.*—Dobbie).—Growth strong; foliage medium; flowers borne on long stalks, large, amber-white, deepening to pale sulphur in the lower petal, prettily edged with violet-purple, which colour is suffused through the upper petals; rays violet-purple. Height 14 inches.

247. Sulphurea (*J. Grieve.*—Dobbie), **A.M.** June 5, 1913.—This is undoubtedly one of the best bedders we have. It is of dwarf and compact habit, with medium foliage. The flowers are also of medium size and of a lovely pale sulphur-yellow colour, deepening in the lower petal, where it approaches primrose-yellow. They are rayless and have crinkled margins. One of the most striking features of this variety is the exceptional freedom with which it blooms. All the plants carried on an average well over forty flowers and buds. The period of flowering extends over a very long season. Height 7 inches.

249. Sunshine (Turner).—A deep golden-yellow, rayless variety, of medium size. The plant is a strong grower, free-flowering, and has a nice habit. Height 1 foot.

250. Swan (*Sydenham.*—G. Wood).—A large-flowered, pure white rayless variety, having a compact and free-flowering habit and large leaves. Height 14 inches.

251. Sydney (*Sydenham.*—Forbes).—Flowers medium, chrome-yellow in colour. Foliage medium. Height 10 inches.

252. The Mearns (*Dicksons.*—Forbes), **XXX** August 5, 1891.—See vol. xxxviii. p. 285. Height 1 foot.

253. The Tweed (*Grieve.*—G. Wood).—Growth compact, vigorous upright, with medium foliage. The flowers are palest sulphury-white and rayless. They are borne in great abundance. Height 13 inches.

254. Thomas Bell (*Forbes.*—Forbes).—See vol. xxxviii. p. 286. Height 1 foot.

256. True Blue (*Dean.*—Dobbie, Forbes).—See vol. xxxviii. p. 286. Height 9 inches.

258. Unnamed seedling (Leslie).—A strong grower, with large foliage and dark purple rayless flowers having an amber-white centre. Height 1 foot.

259. Violetta (*Dr. Stuart.*—Forbes).—See vol. xxxviii. p. 286. Height 9 inches.

260. Virgin White (*Todd.*—Dickson, Dobbie), **A.M.** June 5, 1913.—A strong grower, of spreading habit, with medium-sized pale sulphury-white rayless flowers, borne on long stalks. The plant is exceptionally free-flowering. Height 15 inches.

261. Walter Welsh (*Dicksons.*—Dobbie, Turner), **A.M.** July 26, 1912.—See vol. xxxviii. p. 286. Height 14 inches.

262. Waverley (*Dicksons.*—Dobbie).—See vol. xxxviii. p. 286. Height 1 foot.

263. White Beauty (Dickson).—See vol. xxxviii. p. 286. Height 8 inches.

264. White Duchess (*Baxter.*—Dobbie).—See vol. xxxviii. p. 286. Height 1 foot.

265. White Empress (Dobbie).—See vol. xxxviii. p. 286. Height 9 inches.

266. White Swan (Turner).—This variety is similar to that grown in the trial as 'Swan.'

267. W. H. Woodgate (*Forbes.*—Forbes), **A.M.** July 26, 1912.—See vol. xxxviii. p. 286. Height 1 foot.

268. William Daniels (*Forbes.*—Forbes).—See vol. xxxviii. p. 286. Height 1 foot.

269. William Hamilton (*Dobbie.*—Forbes).—See vol. xxxviii. p. 286. Height 1 foot.

270. William Neil (Dickson, Dobbie, Forbes, Turner), **A.M.** July 5, 1897.—See vol. xxxviii. p. 286. Height 1 foot.

271. William Robb (*Forbes.*—Forbes).—See vol. xxxviii. p. 286. Height 16 inches.

272. Willie Farmer (*Ollar.*—Dobbie).—See vol. xxxviii. p. 287. Height 14 inches.

273. Woodcock (Dobbie).—See vol. xxxviii. p. 287. Height 6 inches.

274. W. P. A. Smyth (Dobbie).—A very vigorous grower, of free-flowering habit. The flowers are of nice form, medium size, pale amber-white colour, with a very faint tint of heliotrope at the margins. Rays blue. Height 14 inches.

275. Yellow Beauty (Dickson).—A compact grower, bearing small, deep golden-yellow flowers, faintly rayed. Height 8 inches.

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The following Pansies were also sent in :—

15. Attraction (Dobbie).—A Pansy of weak, straggling habit. Flowers large, deep velvety purple, margined with pale yellow and tinged with plum-violet. Height 9 inches.

37. Caledonia (Dobbie).—A Pansy of vigorous habit, with large foliage and dark chestnut-brown flowers, tinged with purple and edged with bright yellow. The upper petals are mostly yellow. Height 10 inches.

70. Emmie Bateman (Dobbie).—A Pansy of straggling habit, with dark purple flowers edged with sulphur-yellow, deepening to chrome-yellow in the lower petals. Stems weak. Height 10 inches.

85. Goldfinch (*Baxter.*—Dobbie).—A Pansy of vigorous growth, with big lanceolate leaves and deep chestnut-brown flowers, edged with golden yellow. Height 1 foot.

95. Holroyd Paul (Dobbie).—A very showy Pansy, of vigorous spreading habit. Flowers large, very dark purple, edged with yellow and plum-violet. Height 10 inches.

119. John Picken (Dobbie).—A strong-growing Pansy with large foliage. Flowers deep brown, tinged with purple and edged with yellow and plum-violet. Height 9 inches.

179. Mrs. C. Kay (Dobbie).—A Pansy of compact and free-flowering habit, with large foliage and flowers. The latter are bluish-purple, edged with slate-violet. Height 9 inches.

203. Nurse Young (Dobbie).—A Pansy of good form and vigorous habit. The flowers are of a rich bronze colour, tinged with purple and margined with pale yellow. Height 10 inches.

248. Sunburst (Dobbie).—A large-flowered Pansy of compact habit, with large foliage. It is a shy bloomer and the three lower petals are dark mahogany-edged with chrome-yellow white ; the upper petals are streaked and tinged with shades of violet-purple. Height 8 inches.

255. Tom Christie (Dobbie).—A strong-growing Pansy, with deep chestnut-brown flowers, having the edges tinged with plum-violet. Height 10 inches.

257. Unicorn (Dobbie).—A Pansy of vigorous habit, with medium-sized purplish-brown flowers, edged with lemon-yellow. Height 11 inches.

276. Zulu (Dobbie).—A Pansy of straggling growth. The centre of the flower is almost black, with yellow streaks, while the margins are plum-violet. Height 1 foot.

RELATIVE HARDINESS OF VIOLAS.

List of Violas showing the percentage of plants standing after two seasons on the same site.

Accushla	100	Bradley's Seedling	33
Admiral of the Blues	41	Bridal Morn	83
Agnes Kay	58	Bridegroom	83
Ajax	66	Bronze Kintore	16
A. J. Rowberry	100	Bullion	91
Alpha and Omega	31	Bute Yellow	100
Arabella	100	Campbell Bannerman	83
Archie Grant	96	C. B. Murray	0
Ariel	66	Cecilia	66
Bessie	16	Charles Jordan	0
Blanche	100	Charles Traill	100
Blue Bell	100	Charlotte Chambers	100
Blue Bird	33	Christiana	100
Blue Bonnet	66	Colonel Plumer	83
Blue Cloud	100	*cornuta*	100
Blue Duchess	83	Councillor Waters	83
Blue Gown	100	Countess of Hopetoun	33
Blue King	83	Countess of Kintore	66
Blue Rock	66	Crieffie Smith	0
Blue Stone	100	Crimson Bedder	100
Bradley's Seedling No. 8	66	Cynthia	83
Bradley's Seedling No. 17	100	Darkey	50

Dawn	100	Maggie Currie	100
Dobbie's White Bedder	100	Maggie Mott	94
Duchess of Fife	100	Maid of Lorn	100
Duchess of Sutherland	100	Marchioness	83
Duchess of York	66	Marginata	100
Edina	83	Mary Burnie	83
Edward Molyneux	50	Mauve Queen	50
Elie	100	Max Kolb	100
Eminence	33	Miss Chrissie Paton	66
Florizel	91	Miss D. Brown	50
Fred Williams	100	Miss Finlay	50
G. C. Murray	41	Miss Michie	50
George Palmer	100	Molly Pope	100
Gertie	100	Moseley Perfection	66
Glow	100	Moseley Purple	33
Grievei	100	Mrs. Allsop	83
Hector McDonald	91	Mrs. C. B. Douglas	83
Holyrood	100	Mrs. C. F. Gordon	66
Ithuriel	100	Mrs. Chichester	83
Ivanhoe	83	Mrs. C. Turner	83
James Erskine	66	Mrs. Davidson	100
James Pilling	100	Mrs. Geo. Charles	33
James Sim	83	Mrs. Geo. Paterson	83
Janet Thomson	66	Mrs. Gloag	50
J. B. Riding	100	Mrs. H. Kinross	50
Jean Craik	100	Mrs. J. Girdwood	50
Jenny Houston	50	Mrs. J. Gray	0
John Currie	50	Mrs. J. Kinnear	50
John Ferrier	16	Mrs. Marrison	100
John Forbes	83	Mrs. McGraire	100
John Quarton	91	Mrs. Norris-Elye	66
Jubilee	100	Mrs. Pat	100
Kate Blyth	100	Mrs. R. Ellis	66
Kate Cochrane	58	Mrs. Scott Elliot	100
Kingcup	61	Mrs. T. W. R. Johnston	66
Kitty Bell	88	Mrs. W. Sydenham	50
Klondyke	83	Nellie	83
Lady Grant	66	Nellie Chapman	100
Lady Newlands	66	Nelly M. Brown	100
Lady of the Snows	83	Ophelia	100
Lark	66	Palmer's White	100
Lavender Queen	50	P. A. Smith	100
Lilacina	83	Pembroke	58
Lilian	0	Pencaitland	100
Lizzie Paul	100	Perdita	66
Lyric	83	Polly	50
Mabel	66	Primrose	100
Maggie Clunas	83	Princess May	100

Progress	33	The Mearns	66
Purity	66	Thomas Bell	33
Queen of the Year	100	True Blue	83
Redbraes White	83	Violetta	100
Redbraes Yellow	50	Virgin White	91
Robert Hastie	83	Walter Welsh	66
Robert M. Grier	50	Waverley	83
Robert Neil	66	White Beauty	100
Rolph	100	White Duchess	83
Rotherfield Belle	100	White Empress	33
Royal Blue	83	W. H. Woodgate	50
Royal Scot	100	William Daniels	100
Royal Sovereign	66	William Hamilton	0
Shamrock	100	William Hunter	83
Sir Robert Pullar	33	William Neil	75
Snowflake	83	William Robb	100
Snowline	100	Willie Farmer	100
Sylvia	100	Woodcock	33

The following varieties were especially commended for having stood well through two seasons:—

White.

Dawn
James Pilling
Kate Blyth
Palmer's White
Pencaitland
Snowflake
Virgin White

Yellow and Golden Shades.

Bullion
Grievei
Kingcup
Molly Pope
Primrose
Walter Welsh

Purple and Violet Shades.

Arabella
Archie Grant
cornuta
Countess of Kintore
Ivanhoe
Kitty Bell
Maggie Mott
Max Kolb
Rotherfield Belle
William Robb

Violet-blue and white.

Mrs. Chichester

STRAWBERRIES AT WISLEY, 1913.

SIXTY-SEVEN stocks of Strawberries were grown in the trial, this being the second year after planting. Treating Strawberries as annuals, or, in other words, fruiting the plants the first year, is not a success on the light hot soil at Wisley, but two-year-old plants succeed very well. The crop of 1913 was exceptionally heavy, nearly all the varieties cropping excellently.

F.C.C.=First Class Certificate.

A.M.=Award of Merit.

1. Aprikose (Lloyd).—Fruit large, round, dull red, with prominent seeds; flesh reddish and of good flavour. Crop light; foliage broad.

2. Bar 9 (Laxton).—Fruit large, conical, bright red, seeds prominent, flesh whitish, firm, of rich flavour. Heavy crop; ripe June 26. Foliage large and broad.

3. Bedford Champion (Laxton), **A.M.** July 4, 1905.—Fruit of good size, conical or round, bright scarlet with depressed seeds and whitish flesh, deeply tinted with pink; good flavour. Foliage medium. Very good crop; ripe June 23.

4. British Queen (R.H.S.), **F.C.C.** July 15, 1913.—Fruit large, conical or wedge-shaped, red; flesh firm, whitish, and of excellent flavour. Seeds partially buried; foliage medium. Crop heavy; ripe July 5.

5. Climax (Laxton).—**A.M.** for forcing April 27, 1909. Fruits medium, round or conical, deep red; seeds slightly depressed; flesh firm, whitish, and of good flavour. Foliage small. Crop heavy; ripe July 5.

6. Connoisseur (Laxton), **F.C.C.** July 1, 1913.—This was considered to be the best-flavoured variety in the trial. Fruits large, bright scarlet, wedge-shaped; seeds depressed; flesh whitish. Crop good; ripe June 26. Foliage large and broad, borne on tall petioles.

7. Continuity (Bunyard).—Fruit medium, round, dark red; seeds prominent; flesh firm, whitish, of poor flavour. Crop fair; ripe June 26. Plants of compact habit; foliage medium.

8. Cropper (Laxton), **A.M.** July 15, 1913.—Fruit large, conical, bright red; seeds deeply buried; flesh white and of excellent flavour. Crop very heavy; ripe June 23. Leaves large and broad.

9. Dr. Hogg (Bunyard), **F.C.C.** July 3, 1866.—Fruit large, round, bright red; seeds depressed; flesh firm, whitish; flavour excellent, sharp. Crop good; ripe July 5. Foliage medium. This is one of the best of the later varieties.

10. Dreadnought (Carvill).—This is the result of a cross between 'Sir Joseph Paxton' and 'Dr. Hogg.' Fruit medium, conical, dark

red; seeds depressed; flesh firm, reddish; flavour excellent. Crop good; ripe July 5. Foliage medium.

11. Eaton Grove Favourite (Daniels).—This stock, being received in October 1912, did not mature sufficient fruit for description.

12. Empress of India (Laxton), **F.C.C.** May 17, 1892.—Fruit medium, conical, red; seeds depressed; flesh white and of excellent flavour. Crop fair; ripe July 5. Foliage medium. The Committee did not consider this a true stock.

13. Epicure (Laxton).—Fruit medium, bright scarlet, conical with blunt apex; seeds buried; flesh solid, whitish, and of good flavour. Crop good; ripe June 26. Foliage large and broad.

14. Excelsior (Smiles), **A.M.** June 20, 1911.—Fruit of medium size, oval to wedge-shaped, bright red in colour, with red depressed seeds; flesh pale pink, firm, very juicy, and of excellent flavour. Plant robust, with broad foliage. Crop fair; ripe June 26.

15. Filbert Pine (Laxton).—Fruit rather small, conical or wedge-shaped, dull red; seeds dark and deeply buried; flesh white, solid, and of delicious flavour. Crop moderate; plants strong and vigorous in habit; foliage medium, borne on long petioles.

16. Fillbasket (Laxton), **A.M.** July 23, 1907.—Fruit medium, conical, bright red; seeds depressed; flesh firm, white, of good, rather sharp, flavour. Crop very heavy.

17. Givon's Late Prolific (Laxton), **F.C.C.** July 22, 1902.—This is the best of the late varieties, and is the result of a cross between 'Waterloo' and 'Latest of All.' Fruit large, wedge-shaped, dark crimson; seeds depressed; flesh reddish, firm, juicy, and of excellent flavour. Plants of compact habit, with small leaves borne on short petioles. Crop good.

18. Gunton Park (Laxton), **F.C.C.** July 21, 1891.—Fruit large, wedge-shaped, bright scarlet; seeds buried; flesh reddish, firm, and of good flavour. Crop good; ripe June 26. Foliage large and broad.

19. Kentish Favourite (Pierce), **A.M.** June 25, 1907.—Fruit medium, round or conical, red; seeds prominent; flesh firm, whitish, of good flavour. Crop good; ripe June 26. A compact grower, with small foliage. This variety is considered to be synonymous with 'Leader.'

20. King George V. (Hibberd).—Fruit medium, conical, sometimes wedge-shaped, bright red; seeds yellow, depressed; flesh reddish, firm, and of good flavour. Crop heavy; ripens late. Foliage medium.

21. King George V. (Laxton).—This stock, being received in September 1912, did not mature sufficient fruit for description.

22. La France (Laxton).—Fruit rather small, conical, bright scarlet; seeds dark, prominent. Flesh solid, whitish, of good flavour. Crop heavy; ripe, June 26. Foliage medium; plant a strong grower.

23. La Grosse Sucrée (Laxton).—Fruit medium, long conical, very dark red; seeds buried. Flesh firm, white, and of good flavour. Crop poor; ripe June 26. Plants not vigorous in growth; foliage medium.

24. Latest (Laxton), **A.M.** June 12, 1904.—Fruit very large, heavy, wedge-shaped, deep crimson ; seeds dark, depressed. Flesh deep red, very firm and of excellent flavour. Crop moderate; ripens very late in the season. Foliage medium ; a very robust grower.

25. Latest of All (Laxton), **F.C.C.** July 24, 1894.—A very late variety, obtained as the result of a cross between 'British Queen' and 'Helena Gloede.' Fruit large, conical, or wedge-shaped, red ; seeds prominent, dark. Flesh white, firm, and of good flavour. Crop heavy. A very compact grower.

26. Laxton's Count (Laxton).—A useful variety, raised as the result of a cross between 'Countess' and 'The Bedford.' Fruit medium, conical, bright crimson ; seeds small, prominent. Flesh white, solid, and of good flavour. Crop moderate; ripe July 5. Foliage large.

27. Leader (Laxton), **F.C.C.** May 14, 1895.—Fruit large, broad wedge-shaped, bright red ; seeds slightly depressed. Flesh firm, whitish, and of very good flavour. Crop good; ripe June 26. Foliage medium ; habit dwarf and compact.

28. Lord Suffield (Laxton), **F.C.C.** July 21, 1891.—Fruit mostly small, some large, wedge-shaped, red ; seeds prominent. Flesh reddish, solid, and of good flavour. Crop heavy; ripe June 26. Leaves large, dark green, and very broad. A vigorous grower.

29. Maincrop (Laxton).—A fine maincrop variety, raised from a cross between 'Bedford Champion' and 'The Laxton.' Fruit medium, conical, bright scarlet ; seeds slightly depressed. Flesh whitish, firm, and of good flavour. Crop good; ripe July 7. Foliage medium.

30. Mentmore (Laxton), **A.M.** June 29, 1897.—The result of a cross between 'Noble' and 'British Queen.' Fruit medium, conical, bright crimson ; seeds prominent. Flesh solid, reddish, of good flavour. Crop fair; ripe June 26. Foliage medium ; habit dwarf and compact.

31. Merveille de France (Bunyard, Fisher), **A.M.** September 10, 1912.—An autumn-fruiting variety. Fruit small, roundish, red ; seeds depressed. Flesh white, solid, of good flavour. Crop heavy; ripe July 5. Foliage large, broad ; habit compact.

32. Monarch (Bunyard), **F.C.C.** June 25, 1895.—Fruit medium, wedge-shaped, bright red ; seeds prominent. Flesh firm, white, of very good flavour. Crop heavy; ripe June 26. Foliage large and broad.

33. Monsieur Fournier (Warburton).—Fruit medium, round, dark red ; seeds deeply buried. Flesh whitish, firm, and of excellent flavour. Crop good; ripe June 23. Leaves broad.

34. Noble (Laxton), **F.C.C.** July 1, 1886.—Fruit conical, medium, red; seeds prominent. Flesh reddish, firm ; flavour poor. Crop good ; ripe June 26. Foliage broad.

35. Perpetual (Laxton), **A.M.** September 14, 1907.—Fruit medium, many small, conical or round, dark red ; seeds prominent. Flesh red, firm, of good, sweet flavour. Crop heavy; ripe June 26. Habit dwarf

and compact; leaves small. A continuous cropper from June till autumn. The result of a cross between 'Monarch' and 'St. Joseph.'

36. Peters' Olympia (Peters). **A.M.** July 4, 1911.—This stock, being received in September 1912, did not mature sufficient fruit for description.

37. Pineapple (Laxton).—Fruit medium, conical, dark red; seeds depressed. Flesh whitish, firm, solid, and of good flavour. Crop good; ripe June 26. Foliage large and broad; habit vigorous.

38. President (Bunyard).—Fruit medium, roundish, bright red; seeds depressed. Flesh white, solid, and of rich flavour. Crop fair. Foliage medium.

39. Profit (Laxton).—Fruit very large, broad wedge-shaped, red; seeds not deeply buried. Flesh reddish, firm, and of very good flavour. Foliage medium. Crop good; ripe June 26.

40. Progress (Laxton). **A.M.** July 15, 1913.—A fine late variety. Fruit large, conical, bright red; seeds depressed. Flesh white, solid, of rich flavour. Crop heavy. Foliage very large, broad, dark green, borne on long petioles.

41. Reine d'Août (Bunyard).—Fruit small, conical or round, dull red; seeds dark, prominent. Flesh whitish, solid, of excellent flavour. Crop light; ripe June 23. Habit compact; foliage medium, supported on short petioles.

42. Reliance (Laxton).—Fruit large, wedge-shaped, bright scarlet; seeds prominent. Flesh whitish, solid, and of good flavour. Crop good; ripe June 26. Leaves large, broad; habit vigorous.

43. Reward (Laxton). **A.M.** July 5, 1898.—The award to this Strawberry was confirmed on June 28, 1904. A fine maincrop variety, raised as the result of a cross between 'Royal Sovereign' and 'British Queen.' Fruit medium, rich scarlet, conical; seeds prominent; flesh red, firm, of excellent flavour. Crop fair; ripe June 26. Foliage small; habit compact.

44. Rival (Laxton). **A.M.** July 15, 1913.—Fruit small, bright red, conical; seeds depressed; flesh reddish, solid, of very good flavour. Crop heavy. Foliage medium.

45. Royal Sovereign (Bunyard). **F.C.C.** June 21, 1892.—This is considered to be the best early Strawberry, and for forcing it is excellent. Fruit large, conical, bright scarlet; seeds buried; flesh reddish, solid of, good flavour. Crop moderate; ripe June 26. Leaves large and broad.

46. Scarlet Queen (Laxton).—A fine early variety, resulting from a cross between 'Noble' and 'King of the Earlies.' Fruit small, round, dark red; seeds depressed; flesh reddish, solid, and of excellent flavour. Crop heavy; ripe June 26. Foliage medium; habit compact.

47. Seedling (Kent and Brydon).—Fruit small, conical, bright red; seeds deeply buried; flesh white, solid; flavour poor. Crop heavy. Leaves small, borne on short petioles.

48. Sensation (Laxton).—Fruit medium, round, scarlet; seeds

dark, deeply buried; flesh whitish, flavour poor. Crop heavy; ripe June 26. Foliage broad, abundant.

49. St. Antoine de Padoue (Laxton), **A.M.** August 28, 1900.—A good perpetual-fruiting variety, raised from 'St. Joseph' and 'Royal Sovereign.' Fruit medium, nearly round, bright scarlet; seeds prominent; flesh firm, white, and of pleasant flavour. Crop moderate; ripe June 26. Leaves medium; habit compact.

50. St. Joseph (Laxton), **A.M.** September 20, 1898.—A well-known perpetual-fruiting variety, raised by M. l'Abbé Thivolet, of Chenoves, who crossed the true Alpine Strawberry with a garden variety. Fruit small, roundish, dark red; seeds slightly depressed; flesh white, solid, very juicy, and of good, sweet flavour. Crop poor. Foliage small.

51. The Bedford (Laxton).—This variety, resulting from a cross between 'Dr. Hogg' and 'Sir Charles Napier,' proved to be a weak grower in the Wisley soil. Fruit medium, bluntly conical, bright scarlet; seeds prominent; flesh white, solid, of delicious flavour. Crop poor. Foliage small.

52. The Captain (Laxton).—Fruit small, conical, bright red; seeds dark, buried; flesh white, tinged with red, firm, of good flavour. Crop heavy, late. Foliage medium. This variety was raised from 'Crown Prince' crossed with 'Forman's Excelsior.'

53. The Earl (Laxton).—This variety is the result of a cross between 'Waterloo' and 'Royal Sovereign.' Fruit medium, round, dark red; seeds depressed; flesh whitish, and of excellent flavour. Crop small; ripe July 5. Leaves large and broad.

54. The Laxton (Laxton), **F.C.C.** June 18, 1901.—This variety is the result of a cross between 'Royal Sovereign' and 'Sir Joseph Paxton.' Fruit very large, deep red, conical; seeds slightly depressed; flesh reddish, very juicy, and of good flavour. Crop good; ripe June 26. Foliage medium; habit vigorous.

55. The Queen (Laxton).—This variety did not mature a sufficient crop for description.

56. Trafalgar (Laxton), **A.M.** June 5, 1900.—Fruit large, wedge-shaped, red; seeds reddish, prominent; flesh white and of good flavour. Crop heavy; ripe June 26. Foliage medium.

57. Tuckswood Early (Laxton).—Fruit medium, dark red, conical; seeds depressed; flesh reddish, solid, of fairly good flavour. Crop very heavy; ripe June 26. Foliage medium.

58. Twentieth Century (Vizard).—Fruit large, conical, bright red; seeds buried; flesh reddish, solid, flavour poor. Crop very heavy; ripe July 5. Foliage medium; growth compact.

59. Unique (Laxton).—Fruit medium, bright red, roundish; seeds dark, prominent; flesh white, firm, and of rich, sweet flavour. Crop small; ripe July 5. Foliage broad.

60. Utility (Laxton).—A good late variety. Fruit medium, wedge-shaped, bright crimson; seeds slightly depressed; flesh reddish solid, of good flavour. Foliage medium, borne on short petioles.

61. Veitch's Perfection (J. Veitch), **F.C.C.** July 14, 1896.—The result of a cross between 'British Queen' and 'Waterloo.' Fruit medium, conical, dark red; seeds prominent; flesh white and of good flavour. Crop heavy. Foliage medium and resembling that of 'British Queen.'

62. Veritas (Staward).—This variety, being received in March 1913, did not mature a sufficient crop for description.

63. Vicomtesse Héricart de Thury (Laxton).—Fruit small, a few large, conical, bright red; seeds yellow, slightly imbedded; flesh pale red throughout, firm and solid, richly flavoured. Crop heavy; ripe June 23. Foliage small.

64. V. M. 2 (Laxton).—Fruit medium, round, dark red; seeds prominent; flesh whitish, solid; flavour good. Crop excellent, ripe June 26. Foliage medium.

65. V. Y. 8 (Laxton).—Fruit of good size, roundish, dull red; seeds depressed; flesh whitish, solid, juicy, of excellent, sweet flavour. Crop very heavy; ripe June 26. Foliage large and broad.

66. V. 17 (Laxton).—Fruit medium, conical, dark red; seeds deeply buried; flesh white, solid, of good flavour. Crop good; ripe June 26. Foliage medium; habit compact.

67. Yarles (Lloyd).—Fruit medium, conical, bright red; seeds slightly depressed; flesh reddish, firm and of good flavour. Crop good; ripe June 26. Foliage large and broad.

TOMATOS AT WISLEY, 1913.

NINETY-FOUR stocks of Tomatos, in eighty-eight varieties, were sent in for trial. With a few exceptions sent in late, all were sown on March 11, and grown under exactly similar conditions both inside and outside. For the first time in many years, there was an attack of Black Spot, which we attribute to too much manure, but it was instructive and very interesting to note the varieties that were attacked and those that were immune. Those with fruit free from Black Spot were numbers 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 59, 60, 62, 64, 66, 67, 68, 69, 71, 73, 74, 76, 77, 79, 81, 82, 83, 84, 85, 86, 88, 89, 91, 92, 93. Those with fruit attacked were 1, 5, 58, 61, 63, 65, 70, 72, 75, 80, 87, 90. There was no sign of Black Spot or any other disease on the outdoor plants. The Committee examined both the indoor and outdoor plants.

F.C.C. = First-class Certificate.
A.M. = Award of Merit.
XXX = Highly Commended.

*1. A1 (Sutton).—Fruit medium, round, smooth, bright red; free setter; foliage and habit robust. Crop abundant, borne in good trusses, ripe August 6. Outside crop poor and very late in ripening.

2. Abundance (Sutton).—Fruit small, flat, round, bright red, smooth; fairly good setter; habit and foliage good; crop poor, ripe July 21. Outside crop fair, ripe August 25.

3. Ailsa Craig (Balch), **A.M.** August 30, 1910.—Fruit of moderate size, round, red, smooth; free setter; trusses carrying an average of seven fruits; crop good, ripe July 21. Foliage large, habit vigorous. Outside crop heavy, ripe August 18.

4. Aviator (Dickson and Robinson).—Fruit medium, flat round, dull red, very smooth; very free setter; trusses heavily laden; crop excellent, ripe July 28. Habit sturdy and vigorous. Outside crop very good, ripe August 18.

5. Ayrshire (Balch), **A.M.** August 30, 1910.—Fruit large, roundish, bright red, smooth; free setter; a very strong grower; crop fair, ripe July 28. Outside crop fairly good, ripe August 25.

6. Best of All (Sutton).—Fruit large, flat round, bright red, smooth; free setter; not a vigorous grower; crop medium, ripe August 9. Outside crop fair, ripe August 18.

7. Blenheim Orange (Carter), **A.M.** September 20, 1892.—Fruit of medium size, flat round, pale orange tinged with deeper shades,

* *See* footnote, vol. xxxviii. p. 549.

smooth; a free setter; trusses carrying an average of seven fruits; growth strong; crop good, ripe July 28. Outside crop fair, ripe August 25.

8. Bonny Best (Burpee).—Fruit large, round or slightly flattened, dark red, very smooth; a free setter; trusses carrying an average of seven fruits; crop good, ripe July 21. Habit vigorous, foliage large and healthy. Outside crop good, ripe August 18.

9. Improved Carrick (Balch), **A.M.** August 30, 1910.—Fruit medium, flat round, red, smooth; trusses carrying an average of eight fruits; a very free setter; crop excellent, ripe July 28. Growth very vigorous. Outside crop good, ripe August 18.

10. Cascade (Sutton).—Fruit small, round, bright red, borne abundantly on pendulous racemes measuring about 2 feet in length. Crop ripe July 21. Growth strong; foliage medium and healthy. Outside crop fair, ripe August 25.

11. Champion (Dobbie).—Fruit medium, flat round, bright red, smooth; a free setter and a strong grower; crop good, ripe July 28. Outside crop fair, ripe August 25.

13, 14. Comet (J. Veitch, Wood), **A.M.** July 25, 1899.—Fruit large, flat round, bright red, smooth; a free setter; crop heavy, borne in good trusses; ripe July 28. Growth vigorous. Outside crop fair, ripe August 18.

12. Conference (Dobbie), **F.C.C.** August 13, 1889.—Fruit large, flat round, bright red, smooth; trusses carrying an average of eight fruits; a good setter; habit vigorous. Crop heavy, ripe August 1. Outside crop fairly good, ripe August 25.

15. Dessert (Sutton).—Fruit small, round, dark red, smooth; a free setter; trusses carrying an average of eleven fruits. Crop heavy, ripe July 21. Habit strong, foliage large. Outside crop good, ripe August 11.

16. Duke of York (Carter), **F.C.C.** July 23, 1895.—Fruit medium, flat round, deep red, slightly corrugated, borne in good trusses; a free setter and a good grower. Crop medium, ripe August 1. Outside crop fair, ripe August 25.

17. Dumbleton Favourite (Wheeler).—Fruit, rather small, flat round, bright red; a free setter; crop good, ripe August 1. Plants vigorous. Stock requires a little more selection. Outside crop fair, ripe August 25.

18. Dwarf Gem (Sutton).—Fruit large, deep golden yellow, flat round, smooth, borne in good trusses. The plant is of moderate growth and has dark green, much wrinkled foliage. Crop good, ripe August 1. Outside crop poor, ripe August 25.

19. Dwarf Giant (Burpee).—Fruits medium, flat round, dull red, somewhat corrugated, borne in good trusses; crop good, ripe August 6. Plants of dwarf habit. Outside crop very poor, ripens late.

20. Earliana (Burpee).—Fruits large, round or flat round rather irregular, corrugated, red, borne in well laden trusses; a free setter. Crop good, ripe July 28. Outside crop good, ripe August 11.

21. Earliest (Dobbie).—Fruit medium, bright red, flat round, smooth; a free setter; trusses heavily laden; plants very vigorous. Crop excellent, ripe August 1. Outside crop heavy, ripe August 18.

22. Early Danish (Carter).—Fruit medium, bright red, flat round, smooth; a free setter; trusses carrying an average of six fruits. Plants of good constitution; crop excellent, ripe August 6. Outside crop very good, ripe August 18.

23. Early Dawn (J. Veitch).—Fruit medium, bright red, flat round, smooth; a good setter borne in good trusses; plants vigorous. Crop very good, ripe August 6. Outside crop good, ripe August 18.

24. Early Jewel (Burpee).—Fruit large, very handsome, bright red, flat round, smooth; trusses carrying an average of five fruits. Crop heavy, ripe August 1. A strong grower and a free setter. Outside crop fairly good, ripe August 25.

25, 26.—Early Market (Sutton, Barr).—Fruit medium, flat round, bright red, very smooth, borne in trusses averaging eight fruits. A very free setter and a prolific bearer, ripe August 6. Plants of excellent constitution. Outside crop excellent, ripe August 25.

27. Earliest of All (Sutton).—Fruit large, flat round, light red, smooth; a very free setter; trusses branched. Crop excellent, ripe July 21. Foliage medium; habit robust. Outside crop heavy, ripe August 11.

28. Early Ruby (Barr).—Fruit medium, flat round, bright red, slightly corrugated, borne in good trusses; sets very freely; a strong grower. Crop excellent, ripe July 28. Outside crop good, ripe August 25.

29. Earliest Pink (Burpee).—Fruit medium, flat round, dull red, very smooth, borne in good trusses carrying an average of seven fruits; a free setter. Crop heavy, ripe July 28. Growth vigorous. Outside crop fair, ripe August 11.

30. Eclipse (Sutton).—Fruit large, flat round, bright red, slightly corrugated, borne in good trusses; a free setter; crop heavy, ripe August 1. Plants vigorous. Outside crop fairly good, ripe August 25.

31. Fillbasket (Balch), **A.M.** August 15, 1905.—Fruit large, flat round, smooth, borne in trusses averaging eight fruits each. A free setter; plants strong in growth; crop excellent, ripe August 1. Outside crop very good, ripe August 18.

32. Fordhook Fancy (Burpee).—Fruit small, dull red, flat round, smooth; crop fair, ripe August 6. Plants dwarf; leaves dark green, much wrinkled and very persistent. Outside crop poor, ripe August 25.

33. Frogmore Selected (J. Veitch), **F.C.C.** April 24, 1894.—Fruit medium, light red, smooth, round, borne in good trusses. Crop good, ripe August 6. Plants of very vigorous constitution. Outside crop poor and very late in ripening.

34. Garland (Dobbie), **XXX** August 26, 1913.—A small round variety somewhat like 'Cascade,' borne in pendulous racemes measuring 3 feet in length. The fruits are bright red and are produced

in great abundance. The plant is of vigorous habit and a very free setter. Crop ripe July 28. Outside crop very fair, ripe August 18.

35. Glory (R. Veitch).—Fruit of good size, bright red, flat round, smooth, borne in nice trusses. Crop good, ripe August 6. Plants vigorous in growth. Outside crop fair, ripe August 25.

36. Golden Jubilee (J. Veitch), **F.C.C.** May 26, 1897.—Fruit medium, clear golden colour tinged with orange, perfectly smooth, roundish, borne in trusses averaging five fruits each. Plants sturdy; crop good, ripe August 6. Outside crop fair, but late in ripening.

37. Golden Nugget (Sutton), **F.C.C.** Aug. 14, 1894.—Fruit small, round, very smooth, deep orange-yellow, borne in trusses averaging ten fruits. A very free setter and a prolific bearer, ripe August 1. Plants vigorous in growth. Outside crop fairly good, ripe August 25.

38. Golden Perfection (Sutton).—Fruit large, golden yellow, flat round, smooth, of good shape, borne in good trusses. Crop good, ripe August 6. Plants vigorous in growth. Outside crop poor, ripens very late.

39. Golden Sunrise (Carter), **XXX** August 26, 1913.—Fruits medium, flat round, smooth, golden yellow, borne in trusses averaging eight fruits each. A very free setter; crop heavy, ripe August 1. Outside crop fair, ripe August 11.

40. Greengage (Carter).—Fruit small, but larger than those of No. 37, globular, deep orange-yellow, very smooth, borne in good trusses averaging eight fruits each. Crop very heavy, ripe August 6. Outside crop fair, ripe August 11.

41. Harbinger (Barr).—Fruit medium, flat round, bright red, somewhat corrugated; a free setter. Crop moderate, ripe August 1. Outside crop fair, ripe August 11.

42. Holmes' Ideal (Sydenham), **XXX** August 26, 1913.—Fruit large, roundish, very smooth, bright red, borne in excellent trusses averaging nine fruits each. Plants of good constitution; crop heavy, ripe August 6. Outside crop heavy, ripe August 25.

43. Holyrood (Dobbie), **XXX** August 26, 1913.—Fruit medium, roundish, very smooth, bright red, borne in trusses averaging nine fruits each. Plants vigorous. Crop heavy, ripe August 6. Outside crop fairly good, but very late in ripening.

44. Hurst Marvel (Drover), **XXX** August 26, 1913.—Fruit medium, flat round, bright red, smooth, borne in large trusses. A very free setter and a vigorous grower. Crop heavy, ripe August 9. Outside crop good, ripe September 2. An excellent variety.

45. Invicta (J. Veitch).—A very fine Tomato. Fruit, very large, smooth, round, bright red; crop heavy, ripe August 6. The trusses are heavily laden with fruit. Outside crop very good, ripe August 25.

46. Improved Jolly Boy (Balch).—Fruit large, smooth, bright red, roundish, borne in good trusses, ripe about August 6. Crop good. Plants of vigorous constitution. Outside crop good, but late in ripening.

47. Liberty (Dickson), **XXX** August 26, 1913.—Fruit medium, round, bright red, very smooth, borne in good trusses averaging nine fruits each. Crop heavy, ripe August 6. Plants strong. Outside crop fair, but late in ripening.

48. Lightning (Barr), **XXX** August 26, 1913.—Fruit medium, bright red, smooth, roundish, borne in good trusses averaging nine fruits. Plants exceptionally vigorous; a free setter; crop heavy, ripe August 6. Outside crop heavy, ripe August 25.

49. Little Gem (Barr), **F.C.C.** August 20, 1877.—A curious variety, of moderate height, with small, very much wrinkled, dark green foliage; fruit very small, bright red, flat round, very smooth, borne in crowded racemes; a free setter. Crop heavy, ripe August 6. Outside crop poor, ripe September 2.

50. Little Marvel (Dickson).—Fruit large, very smooth, bright red, flat round, borne in good trusses; a free setter and a vigorous grower. Crop good, ripe August 6. Outside crop good, ripe August 25.

51. Locksheath Marvel (Locksheath).—Fruit large, flat round, bright red, very smooth, borne in good trusses. Crop good, ripe August 1. Growth vigorous. Outside crop heavy, ripe August 18.

52. Longkeeper (Barr).—Fruit very large, flat round, dull cherry red, smooth, borne in good trusses; a free setter and a prolific bearer, ripe August 1. Growth very vigorous and healthy. Outside crop fair, ripe August 25.

53. Long Purple (Barr).—Fruit small, round conical, dark red, smooth, borne in large trusses averaging eight or nine fruits each. A free setter, bearing a heavy crop, ripe August 6. Plants of good constitution. Outside crop poor and ripening late.

54. Lucullus (Heinemann).—Fruit medium, flat round, very smooth, bright red, borne in trusses averaging seven fruits. Crop heavy, ripe August 5. Plants of good constitution; a free setter. Outside crop heavy, ripe August 25.

55. Magnificent (Barr).—Fruit medium, bright fiery red, flat round, slightly corrugated, borne in large trusses. Crop heavy, ripe August 5. A free setter and a strong grower. Outside crop poor, ripe August 25.

56. Magnum Bonum (Sutton).—Fruit medium, flat round, bright red, slightly corrugated, borne in large trusses on strong, vigorous plants. Crop good, ripe August 5. Outside crop good, ripe August 25.

57. Maincrop (Sutton).—Fruit large, flat round, bright red, smooth; a free setter and a vigorous grower. Crop good, ripe July 28. Outside crop good, ripe August 18.

58. Mark's Tey (Dobbie).—Fruit rather small, flat round, bright red, very smooth; a free setter and a vigorous grower; crop good, ripe August 6. Outside crop good, ripe August 25.

59. Marvel (Turner).—Fruit medium round, fiery red, smooth. A free setter; crop good, ripe August 5. Plants strong in growth. Outside crop good, ripe August 25.

60. Matchless (Wheeler).—Fruits rather small, but of useful size, flat round, bright red, smooth, borne in great abundance in good trusses. Ripe August 5. Outside crop good, ripe August 25. A vigorous grower.

61. Moneymaker (Dickson and Robinson).—Fruit large, round, fiery red, smooth. Trusses large, crop good, ripe August 5. Growth vigorous. Outside crop fair, ripe August 25.

62. New Dwarf Red (J. Veitch), **A.M.** August 15, 1905.—Fruit medium, dark red, roundish, very smooth; a free setter; crop moderate, ripe August 6. Plants strong. Outside crop fairly good, but late in ripening. Height about 4 feet.

63. Northern King (Barr).—Fruit medium, flat round, smooth, bright red, borne in fair trusses; crop fair, ripe August 30, the latest indoor tomato in the trial. Plants very strong in growth. Outside crop poor and late in ripening.

64, 65, 66. Open Air (Dickson, Sutton, Sydenham).—Fruit large, sets freely, bright red, flatter than most varieties, borne in large trusses. The plant is a vigorous grower and produced heavy crops, ripening August 1 under glass and about 20 days later in the open, where the fruit attained a very large size.

67. Peachblow (Sutton).—A very distinct variety, having large round and very smooth fruits of a delicate carthamus red colour. They are borne in trusses averaging eight fruits. Plants very strong in growth, carrying a heavy crop, commencing to ripen August 2. Outside crop good, ripe August 28.

68. Pear-Shaped (Barr), **XXX** August 26, 1913.—A small pear-shaped fruit, very smooth, bright red, borne with great freedom in pendulous racemes averaging ten fruits. The plant is sturdy in growth. Crop heavy, ripe July 28. Outside crop fair, ripe August 25.

69. Perfection (Sutton).—Fruit large, very bright red, flat round, slightly corrugated, borne in good trusses. Crop fair, ripe August 5. Plants vigorous in growth. Outside crop poor, ripe September 2.

70. Pride of the Market (Barr).—Fruit medium, flat round, slightly corrugated, bright red. Crop fair, ripe August 6. Plants vigorous. Outside crop fair, ripe August 25.

71. Primus (Roscoe).—Fruit medium, round, red, smooth, sets freely. The trusses carry an average of seven fruits. Foliage medium, habit vigorous. Crop good, ripe July 21. Outdoor crop heavy, ripe August 11.

72. Princess of Wales (Sutton), **A.M.** August 15, 1905.—Fruit medium, flat round, dark red, smooth, sets freely. Crop fair, ripe August 9. Plants sturdy. Outdoor crop fair, ripe August 18.

73. Prolific (Wheeler).—Fruit medium, round, bright red, smooth, borne in large trusses. Plants of vigorous constitution and having large leaves in which the usual serration is almost absent. Crop excellent, ripe August 5. Outdoor crop very good, ripe August 11.

74. Quarter Century (Burpee).—Fruit medium, flat round, bright scarlet; the plants are of short-jointed, sturdy growth, with dark

green, much wrinkled foliage. Crop fair, ripe August 5. Outdoor crop poor, ripe September 2.

75. Red Riding Hood (Barr).—Fruit large, flat round, bright red, smooth. The trusses are straggling and carry an average of seven fruits. Habit vigorous; foliage large. Crop good, ripe July 21. Outside crop fair, ripe August 18.

76. Satisfaction (Sutton), **A.M.** August 15, 1905.—Fruit large, roundish, bright red, smooth, sets freely. Growth strong. Crop good, ripe July 28. Outdoor crop fair, ripe August 18.

77. Solidarity (Martin).—Fruit large, bright red, smooth, borne in good trusses. Plants healthy and vigorous. Crop very good, ripe August 5. Owing to the weak germination of this variety, it was impossible to obtain sufficient plants for a trial in the open.

78, 79. Stirling Castle (R. and J. Veitch), **A.M.** September 6, 1898.—Fruit medium, very smooth, flat round, bright red; plants strong and vigorous. A free setter, bearing good trusses. Crop good, ripe August 7. Outdoor crop very good, ripe August 25.

80. Sunbeam (Sutton).—An exceptionally vigorous grower, bearing roundish smooth fruits of medium size and of a pale orange-yellow colour. Crop poor, ripe August 5. Outdoor crop fair, ripe August 25.

81, 82. Sunrise (R. Veitch, Carter), **F.C.C.** July 4, 1905.—The medium-sized fruits of this well-known variety are borne in great abundance on good trusses. They are roundish, smooth, bright red, and set very freely. Plants of strong constitution; crop excellent, ripe August 2. Outdoor crop good, ripe August 25.

83. Sunrise Improved (Carter).—Similar to Nos. 81 and 82, but have somewhat longer trusses.

84. Surprise (Grainger).—Fruit medium, fiery red, flat round, smooth. Crop moderate, ripe August 5. Plants of vigorous constitution. Outdoor crop fairly good, ripe August 25.

85. The Hastings (J. Veitch).—Fruit small, flat round, very bright red, smooth; trusses well laden, a free setter and a vigorous grower. Crop heavy, ripe July 28. Outdoor crop fair, but late in ripening.

86. Thick-fleshed (Barr).—A very vigorous grower, bearing large smooth fruits, flat round in shape and bright red in colour; trusses well laden. Crop good, sets freely, ripe August 9. Outdoor crop fair, ripens late.

87. Victory (J. Veitch).—Fruit medium, flat round, bright red, smooth, sets freely. Crop good, ripening indoors August 9 and in the open September 2.

88. Water Baby (Balch).—Fruit large, flat round, lobed, bright red, smooth, sets very freely. The trusses are heavily laden. Growth vigorous and strong, leaves large. Crop very good, ripe July 21. Outdoor crop good, ripe August 18.

89.—Winter Beauty (Sutton), **A.M.** April 18, 1899.—Fruit large, flat round, bright red, smooth, sets well. Crop good, ripe July 28. Outdoor crop fair, ripe August 25. A strong and vigorous grower.

90. Earliana (Staward).—This and the four following varieties were sent in late. Fruit similar to that of No. 20. Crop good, ripe July 21. Outdoor crop fair, ripe August 25.

91. Export of Libia (Dammann).—Fruit large, flat round, bright red, somewhat corrugated, borne in medium trusses. A free setter. Crop fair, ripe August 9. Requires a little more selection.

92. Fire of Vesuvius (Dammann).—Fruit small, bright scarlet, smooth, pear-shaped, borne in well-furnished trusses. Plants of vigorous growth. Crop heavy, ripe August 2. Foliage entire.

93. King Humbert (Dammann).—Fruit small, oval, dull red, borne in good trusses, averaging eight to nine fruits. Plants vigorous in growth. Crop heavy, ripe August 9.

94. Newnham Paddox Prolific (Harmon).—Plants of this variety were sent in and were all planted in the open ground. Fruit medium, roundish, smooth, red, borne in trusses averaging eight fruits. Crop excellent, ripe September 1. Plants healthy and vigorous.

COMMONPLACE NOTES.

By the Secretary, Superintendent, and Editor.

National Diploma in Horticulture.

The particular attention of the Fellows is invited to the scheme for the establishment of a National Diploma in Horticulture which has been for some time occupying the attention of the Council. This scheme has been submitted to and approved by the Board of Agriculture, and will meet the demand that exists among professional horticulturists for some tangible mark of their professional ability, such as is open to the members of many other professions. The Society's General Examination imposed no test of practical skill and was open to all, but the Diploma Examinations are intended for professional gardeners, and will be confined to them on the lines laid down in the scheme, while the principal feature of the examinations will be the practical tests they include. Full particulars may now be obtained of the Secretary.

Saxifraga Burseriana major.

Saxifraga Burseriana is one of the most beautiful of the "cushion" Saxifrages, not always easy to establish, but well repaying any trouble it may cost. It has produced several varieties, one of which, 'Gloria,' gained an Award of Merit in 1907, while the type had a First-class Certificate as long ago as 1884. Fig. 139 represents the form known as *major*. It is from a photograph kindly sent us by Colonel Hervey, in whose garden at Thurston, Bury St. Edmund's, it was growing. It is there planted in the rock garden with a south-east exposure. Like its parent type it flowers very early, in March, producing its huge white flowers—huge for the size of the plant—about 2 inches above the rosette of leaves.

Plant Propagation.

We have little doubt the following letter we recently received and Prof. Balfour's reply will be of interest to many of our Fellows. The method of propagation mentioned is one we have found remarkably productive of results, and the details referred to will clear up any little misunderstanding there might possibly be concerning it. A Fellow writes: "Can you help an interested but very ignorant member of the R.H.S. more fully to understand the article in the last issue (of the R.H.S. Journal, March 1913) on the propagation of plants? My attention was drawn to the article in the first place

by an amateur gardening friend, who herself has the privilege of Canon Ellacombe's acquaintance; she had seen, and described to me roughly, his method of striking cuttings, which is referred to in Prof. Balfour's article as the 'French' method. Almost all cuttings can be rooted in a fortnight by this method, I gather; but can you tell me, must the 'full sunshine,' in which the propagating frame has to be placed, endure for a fortnight? If so, when could one ever dare to begin? Am I right in deducing from the article that by this method one may increase one's stock of plants at almost any time of the year? For amateur gardeners with no 'glass' and small purses, and who too are often absent from home at critical seasons of the year, this prospect is a delightful one. . . . May I add yet another question? When the 'full sunshine' fails should the watering every half-hour be continued?"

Professor Balfour replies: "The expression 'full sunshine' indicates an exposure in the double sense of (1) the position of the frames so as to secure the maximum of direct sunlight, and (2) the absence of all shade. There is, unfortunately, never a period of continuous full sunshine for a fortnight in this country.

"Cuttings can be struck by the method at any time of the year if the plant is suitable and the right part of the plant is taken. The striking will be slower or more rapid according to the circumstances.

"If the day is cloudy throughout, one watering will be ample. If the glimpses of sunshine are transient, two or three waterings will be sufficient.

"It may be helpful to add: (1) the medium for striking should be sand; (2) the cutting must be put in no deeper than is enough to keep it erect, and (3) there must be no preparatory dibbling; the cutting must be pushed into the sand and watered at once. The water must settle the sand round the cutting.

"The water used should be as near the temperature of the sand as possible, at least it should not be so cold as to chill. A thermometer should therefore be placed in the sand."

Renovation of an Old Tree.

It not infrequently happens that one desires to save a tree that seems doomed to death but which has interesting associations with the past that no new and vigorous seedling can possibly have. The method illustrated in fig. 140 is one that may be used in some cases. The tree is a medlar, known as the 'George Herbert Medlar.' It was planted by George Herbert in 1632 in the Rectory garden at Bemerton, near Salisbury, and had almost reached the end of its long life when it occurred to Mr. Thos. Sharp, County Instructor in Horticulture in Wilts, to inarch it. A whitethorn was planted in 1907 and a branch (fortunately near the ground) was inarched upon it in the spring of 1908. The union was successful, and new vigour has been imparted to the tree. In 1913 an attempt was made to

FIG. 139.—SAXIFRAGA BURSERIANA MAJOR

[*To face p.* 416.

Fig. 146.—The 'Common Hedge' Mahoe. Planted 1931. Aged 10 yrs.

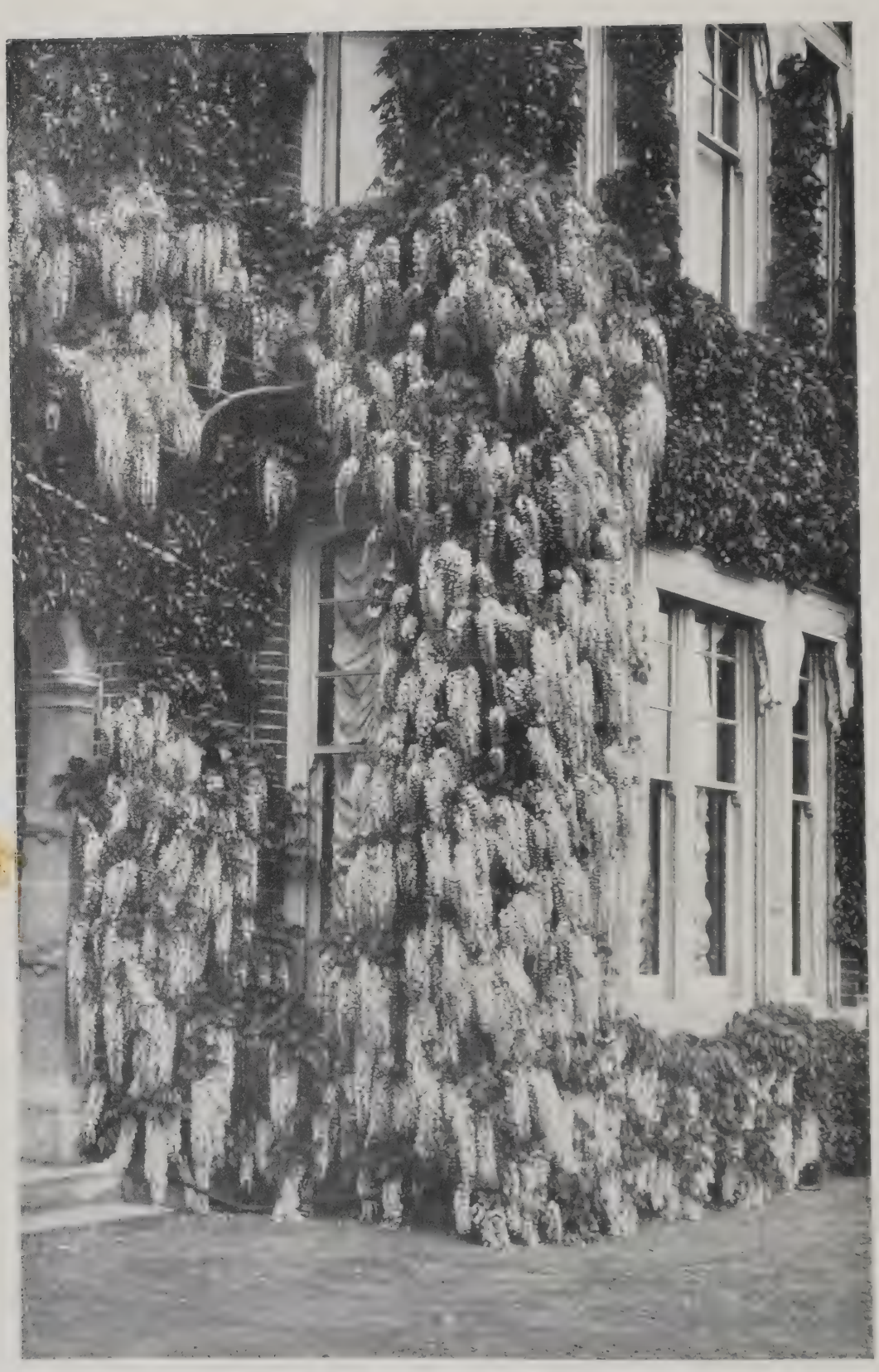

Fig. 141.—Wistaria multijuga at Winterfold, Cranleigh, Surrey.

assist the other part of the tree by grafting in a bridge of whitethorn some three and a half feet long between the renovated part and another old branch, with what result remains to be seen.

Wistaria multijuga.

The beautiful *Wistaria multijuga* is far less known than its congener *W. chinensis*, yet its lilac and purple flowers in racemes not rarely thirty inches in length make it a most beautiful summer-flowering climber. It does not appear more exacting in its requirements than *W. chinensis*, and perhaps it is only because the latter was introduced from China in 1812, while *W. multijuga* did not reach our shores from Japan until 1874, that it is so little known. It is a favourite in Japanese gardens, and is perhaps at its best when associated with water in the garden as it is on the bridge at Wisley, but that it can be most decorative on a house is well shown by fig. 141, which by the kindness of Lord Alverstone we are able to reproduce. It was planted at Winterfold about twenty years ago and did not bloom for some time afterwards, as is not unknown with *W. chinensis*.

EXAMINATION OF SCHOOL TEACHERS IN COTTAGE AND ALLOTMENT GARDENING.

April 23, 1913.

There was a reduction of 93 in the number of candidates for this examination, held on April 23, 1913, compared with last year, the number being 996 as against 1,089 in 1912. Of them 142 obtained a position in the first class, 426 in the second, and 320 in the third, leaving 83 failures, and 25 absentees.

The Examiners, Mr. F. J. Chittenden, F.L.S., Mr. John Fraser, F.L.S., Mr. John Odell, and Mr. C. R. Fielder, V.M.H., report as follows:—

Some of the questions in Section A were answered remarkably well, showing a very fair knowledge of practical gardening and the factors and conditions necessary for successful cultivation. This remark applies particularly to Question 4 (on seed) which was mostly well answered. Some candidates, however, failed to differentiate between true seed and "seed" potatos. There is still an inclination to be over lavish in the use of farmyard manure; and in the case of artificial manures, the proportions of Phosphate, Potash, and Nitrate were given for certain crops, but frequently without any indication as to the *quantity* to be applied per yard or rod—a most important detail.

Some of the candidates did not know the difference between hardy and half-hardy Annuals, and between shrubs and herbaceous plants, the rose being frequently classed as an herbaceous plant, and the Christmas Rose as a shrub.

The Examiners are disappointed with the character of the answers in Section B. Care was taken to frame the questions so that they could not be answered adequately by Candidates who had merely "read up" for the examination without making themselves acquainted with the facts by observation of common garden plants. The main faults in the replies arose from lack of such acquaintance and a failure to read the questions asked as they were written; whilst the introduction of irrelevant matters into answers furnished evidence of a deficient knowledge of the subject of the question. Only the eleventh question in Section B was at all satisfactorily answered by perhaps half of the candidates.

Candidates would economize time and paper if they were more concise and systematic in their answers. In many instances matter relating to different parts of a question was so mixed up as to make it extremely difficult for the Examiners to give full value for the work done.

W. WILKS, *Secretary.*

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BOOK REVIEWS.

"Garden Craft in Europe." By H. Inigo Triggs. La. 8vo., 332 pp. (B. T. Batsford, London, 1913.) £1 15s. net.

This is a very handsome book, well printed on art paper, copiously illustrated and stoutly bound in an attractively designed cover.

The subject is a comprehensive one, for the author tells us about garden craft in Europe from the earliest ages when Greek and Roman were laying the foundations of an art that has always appealed most strongly to the succeeding nations as they have progressed in civilization.

The reader in turning over the leaves will not fail to be struck with the elegance and artistic nature of many of the illustrations. The frontispiece is a fine portrait of that prince of French gardeners, the great Le Nôtre; and one or two other portraits of celebrated garden designers such as "Capability" Brown, Humphrey Repton, Jan Vredeman de Vries, are not less interesting. About a dozen full-paged plates, mostly views in famous gardens, are reproduced in collotype adding beauty to the general excellence of the illustrations that are profusely inserted throughout the work. There are approximately three hundred of these, done in photogravure or similar process and consisting of garden plans, views of historic gardens and a variety of vases of artistic design, and the many accessories connected with the embellishment of gardens at home and abroad. Some quaint reproductions of garden scenes from medieval manuscripts, "The Romaunt of the Rose," "The Grimani Breviary," &c., are also included.

The text is divided into eleven chapters in which the author discourses in a most attractive manner upon the ancient gardens of Europe, passing on to a review of those of the Middle Ages. The chapter on Italian gardens forms by no means the least interesting portion of the volume to the reader who has had the joy of wandering through them, or some of them. We note especially the pictures and references to the gardens of the Vatican, Boboli, the Villa Castello, Villa Marlia, Villa Caprarola, Villa Lante, &c., but of course those who wish for fuller information upon this subject will turn to the much more important work by Mr. Triggs published a few years ago, a grand folio, bearing the title of "The Art of Garden Design in Italy."

Nearly a hundred pages are devoted to a consideration of the French gardens of the sixteenth and early seventeenth centuries and an entire chapter is given on Le Nôtre and Versailles. The gardens at Fontainebleau, Vaux-le-Comte, Chantilly, Versailles with the Trianons, Meudon, Marly, St. Cloud, and others receive liberal treatment which will be highly appreciated by the critical reader. We have only one little criticism at this point to make, and that is that our author

erroneously states, on page 222, that London and Wise published "The Retired Gardener," which is a translation of "Le Jardinier Solitaire" by the Sieur Louis Liger of Auxerre. This is certainly not the fact. "The Retir'd Gard'ner" by London and Wise is a translation of *two* French books, "Le Jardinier Solitaire" by Dom Gentil, a Carthusian monk known as Frère François, and "Le Jardinier Fleuriste" by Louis Liger. Both books were enormously popular in France and for many years enjoyed a high degree of public favour there.

We can only briefly indicate the nature of the remaining portion of the work now before us. Garden design in the Netherlands occupies over forty pages and there are some very quaint reproductions given of Dutch gardens as they appeared in the Middle Ages.

A review of German and Austrian gardens follows; then we have a chapter on Garden Design in Spain. The English landscape school and its influence on the Continent also receive treatment, the whole work forming a veritable mine of information, literary, historic and artistic, upon gardens in all times and in all European countries.

At the end of the volume which we leave with some little reluctance is a bibliography of the most important books that have been published on garden craft in Europe and the final pages are devoted to a capital Index to the text and illustrations.

We have much enjoyed Mr. Triggs' latest addition to horticultural literature as we are confident many of our readers will when they become the possessors of this very valuable and interesting volume. It can be strongly recommended as a standard work for the shelves of any Horticultural Society's library.

"Researches on Irritability of Plants." By J. C. Bose, M.A., D.Sc., C.S.I. With 190 illustrations. 8vo., 376 pp. (Longmans, London, 1913.) 7*s*. 6*d*. net.

Dr. Bose is well known from his previous works on Plant-response. The present volume is a further contribution on the same subject, but treated by means of new methods and scientific implements, by the aid of which not only was "light thrown on many obscure problems, but also discoveries of several important and new phenomena were made." The work contains twenty-six chapters, each replete with results of experiments, intensely interesting to scientists.

Response of plants is seen externally in many ways, as by turning to the sun, transpiration of water, &c., but it is to the *internal* effects, not perceptible to the eye, that Dr. Bose has turned his attention. Of the numerous problems to be solved are those to discover if the responses of vegetable protoplasm are essentially the same as in animals; for in both "plant and animal alike there is the occurrence of a fundamental excitatory protoplasmic change which finds external expression in alteration of form."

Having described the mechanism of his new "Resonant Recorder," Dr. Bose gives the methods of stimulation, sent as a mechanical blow,

chemical agents, thermal and electrical excitements, &c. The plant used was the sensitive *Mimosa pudica*. Besides quantitative movements, time relations were investigated; thus the normal maximum rate of movement was found to be 50 mm. per second. Temperature enhances the rate.

"By means of electric response, it may be shown that every plant, and every organ of the plant, is sensitive and responds to stimulation by a definite electric change. The sensitiveness of *Mimosa* to electrical stimulus is high, and may even exceed that of a human subject."

Dr. Bose shows also the "Influence of Load" and the "Work performed by the Plant:" that the recording response is greater in proportion to the weight, and that if W_1, W_2, W_3 indicate increasing weights, and h_1, h_2 h_3 the corresponding heights of response, then $W_1 h_1 < W_2 h_2 > W_3 h_3$; "in other words, the work performed is increased under enhanced load and increasing tension."

Though not alluded to, this corresponds with the *visible* effects; for if a young petiole be weighted, there will be found a considerable increase in the amount of mechanical tissues when full grown, over that of a normal petiole, which only supports the blade.

Space will not allow a detailed description of the book; but the above will reveal the importance of this work to all interested in vital phenomena.

"Plants and their Uses: An Introduction to Botany." By F. L. Sargent. With numerous illustrations. 8vo., 610 pp. (Holt, New York, 1913.) $1.25.

This is an excellent treatise on useful plants, with an abundance of illustrations. After a preliminary chapter on The Study of Plants, the author deals with cereals, various food plants, flavouring, and medicinal and industrial plants.

Chapter VII. deals with Classification, &c., so as to introduce typical natural orders with useful plants.

Now we must turn to what seems to us to be quite superfluous and troublesome. Pp. 404–427 contain formulæ of some 270 or more genera indicated by letters and symbols. Thus for example:

Clematis.—CE ∞, o Eîe2 + T Cj $< \infty$ *E*1 *G–N*.

When we remember that there are four sepals, no corolla, ∞ stamens, ∞ carpels; all parts *free*; we do not see the use of the above.

Discussing different views as to the origin of species, the author offers a new factor, "choice." "A living thing is active as well as passive. The idea is thus suggested that organic evolution may have as its controlling factor some power of choice, essentially like our own, residing in all living organisms—a will as truly free."

The fallacy underlying this idea is that the author does not appear to perceive the differences between "automatism" and "free will." It is accepted that man alone has the latter and can "choose," and that no other being can do this, but acts *automatically* under the

directivity of life, for it can *not be conscious* of any *abstract idea*. It cannot think "This is I," nor *consciously weigh* the merits or demerits of things so as deliberately to "choose," but responds to whatsoever impulse comes from without.

Taking the book as a whole, it is a valuable one for students.

"Weeds: Simple Lessons for Children." By R. Lloyd Praeger. 8vo., x + 108 pp. (University Press, Cambridge, 1913). 1*s*. 6*d*. net.

Weeds have been receiving considerable attention of late from writers and legislators alike, and this little book of nature-study of weeds is a welcome addition. It is intended for the guidance of children's studies, not as a manual for the farmer or gardener, and as such it is admirable. The author describes most of the common "plants which grow in places where man does not want them to grow" and shows how they come to invade the fields and pastures, and at the same time gives an interesting and accurate account of the manner of life of plants. The illustrations are numerous and well chosen to illuminate the text and add to the interest of the reader.

"With Camera and Rücksack in the Oberland and Valais." By R. A. Malby. 8vo., 310 pp. (Headley, London, 1913.) 10*s*. 6*d*. net.

This book is hardly a gardening book. It contains a description of Mr. Malby's two visits to Switzerland, undertaken mainly with a view to studying alpine plants in their natural habitat. For the ordinary tourist Mr. Malby's wanderings in well-known parts of Switzerland do not present any features of novelty, but for the cultivator of alpine plants the book is of interest, very much enhanced by the excellent photographs, coloured and plain, showing studies of rock plants. Mr. Malby's remarks on the building of rock gardens, based upon his observations in the Alps, are much to the point. Alpine plants do not naturally grow on rocks which show stratification, but where accumulations of soil and detritus have settled on Alpine slopes among the rocks.

"The Violet Book." By A. and D. Allen-Brown. 8vo., 109 pp. (Lane, London, 1912.) 5*s*. net.

There are not too many books on the Violet, and this volume is a most useful addition to the literature on this esteemed flower. We have only one objection to the information given in the book, and that is where the authors on p. 41, under the heading of October and November, state "The time has now arrived when preparation must be made for the reception of those plants which are to be moved into homes for the winter season." This is followed by excellent instructions on how the work should be done, but in our opinion

October and November are too late to plant Violets in frames, even if ever so carefully planted. We find early in September the best time to plant in frames, as the roots get well established before the winter, and abundant flowers are produced from October onwards. Otherwise we must strongly commend this carefully-written book to Violet-growers in large and small gardens. The matter is thoroughly practical, and if the advice given is strictly followed out there will be no difficulty in obtaining abundance of these sweet little flowers through the winter where the atmosphere is pure. It is interesting to note how greatly the Violet was esteemed by Greeks and Celts, and the younger Pliny, describing the villa he built for himself near the shores of the Tuscan Sea, says: "Before the gallery lies a terrace perfumed with Violets." Another interesting remark in the book is that "In 1564 the first mention of double Violets is made by Rombert de Dodome." Does this mean Rembert Dodoens?

"Gardening." By A. Cecil Bartlett. 94 pp. (Jack, London, 1913.) 6*d*. net.

A well-written little book, dealing with the chief garden operations in a brief manner. The author has done well to cram so much information on garden-making, soil, manures, seeds, planting, lawns, propagating, pruning, enemies and diseases, &c., into such a small compass. The printing is good, and an index finishes the book.

"The National Rose Society's Rose Annual for 1913." Edited by E. Mawley. 8vo., 239 pp. (E. Mawley, Berkhamsted, 1913.) 2*s*. 6*d*. net.

All who grow Roses should get this volume from the Hon. Secretary, Mr. Edward Mawley, Rosebank, Berkhamsted, as it is the most interesting and instructive annual we have seen. Its value is greatly enhanced by the Report of the International Conference on the Modern Development of the Rose, held on May 20, 1912. Many foreign rosarians attended and their speeches are full of ideas for the British grower. Practically everything connected with Rose-growing is dealt with by the various speakers and writers, and from one end to the other the annual is worthy of the most careful study. Lovers of all types of Roses will find their particular favourites discussed, and their habits, likes, and dislikes treated upon; failures and successes are freely recorded, and in this way one learns much. There are about four coloured photographs, beautifully executed, and also many other pleasing illustrations. In brief, we can only repeat our advice, viz. to get the book.

"Vegetable Culture for Amateurs." By Trevor Monmouth. 8vo., 80 pp., 3rd edition. (Upcott Gill, London, 1913.) 1s. net.

We have rarely read a book containing so much sound practical information in such a clear and concise form as this. The whole edition has been re-written, and brought up to date, not only in the

best varieties of each kind of vegetables and salads to grow, but the information on the cultivation of all is equally up to date. A carefully-compiled calendar of operations for each month is given, showing that it is easy by good cultivation to have a full supply of vegetables and salads all the year round. Practical suggestions on how the soil may be improved, and the importance of rotation in crops is fully dealt with. Again, the manuring question is treated in a thoroughly clear and sound manner, and the eradication of the most injurious insect and other pests is equally ably gone into. There are two things we are specially pleased to note in the book, viz. the advice on the value of continuously keeping the Dutch hoe going, whether there are weeds or not, and the strong remarks on the waste of soil fertility by leaving the stumps of vegetables, such as Broccoli, Cabbage, &c., in the soil after the head has been cut. We commend to all garden owners the advice given by the author on these two subjects.

Although the book is written for the amateur, to whom it will be most serviceable, the professional gardener may read it with profit to himself. The whole is arranged in alphabetical order, the printing is good, and the illustrations are very typical of what they represent. Altogether it is an excellent shilling's-worth.

"Beautiful Garden Flowers for Town and Country." By John Weathers. 8vo., 152 pp. (Simpkin, Marshall, Hamilton, Kent & Co., London, 1913.) 1*s.* 6*d.* net.

A useful and well-written book, boldly printed, nicely illustrated, and with the botanical as well as the common names of all the flowers mentioned. This is always an advantage, for many who cannot remember the often difficult botanical name are quite familiar with the common one. The author covers a wide field, treating of the soil, situation, cultivation, diseases, annuals, biennials, perennials, colour effects, propagation, and giving excellent descriptions of the best hardy flowers in alphabetical order.

"Beautiful Bulbous Plants for the Open Air." By John Weathers. 8vo., 150 pp. (Simpkin, Marshall, Hamilton, Kent & Co., London, 1913.) 1*s.* 6*d.* net.

This is one of the same series as "Beautiful Garden Flowers," and all that is stated about the arrangement of that book applies to this. The author has evidently carefully studied the subject of bulb cultivation, and he gives much practical information on their management, time and depth to plant, and much other equally interesting and useful knowledge.

"The Sweet Pea Annual for 1913." Ed. by Charles H. Curtis and Horace J. Wright. 8vo., 136 pp. (C. H. Curtis, Brentford, 1913.) 2*s.* net.

This is the best of the series published during the past nine years, and will be of considerable interest to all growers of Sweet Peas, as

it contains the Report of the Fourth Sweet Pea Conference, and other matter specially appealing to growers of this popular flower. There is a table of contents, but no index.

"Twentieth-Century Gardening." By John Weathers. 8vo., 311 pp. (Simpkin, Marshall, Hamilton, Kent & Co., London, 1913.) 1*s.* net.

It is really extraordinary how such a large book, so well written and printed, can be published for such a small sum. This volume will be of assistance to the amateur gardener, as its contents range from the making of a garden, the treatment of soils, lawns, glass structures, herbaceous and other plants: in fact, pretty well everything found in a moderate-sized garden. Perhaps too much is made of one particular manure.

"Gardening." By L. Williams. 16mo., 304 pp. (Nelson & Sons, London, 1913.) 1*s.* net.

This is another marvellous little book for the money, of handy size, as it may be easily put in one's pocket, and full of sound information.

"Garden-Work for Every Day." By H. H. Thomas. 8vo., 156 pp. (Cassell, London, 1913.) 1*s.* net; cloth, 1*s.* 6*d.* net.

The title exactly describes this excellent little book, as it tells the operations in the garden for every day through the whole year in a very clear and concise manner.

"Fruits and Vegetables under Glass." By William Turner. 4to., 255 pp. (Routledge, London, 1912.) 21*s.* net.

Written by a well-known authority in the United States for readers there, we can strongly recommend this book to British gardeners as a thoroughly good book to have and to study. The advice given all through may be followed in almost every case. Conditions are different in America from what they are in this country, and the author recommends more ventilation in the summer months than would be safe or advisable in this country with our changeable climate; but, making allowance for the different conditions of climate, all practical men will agree that the author has written a really sound and interesting book, full of instructive matter from end to end. Every phase of fruit and vegetable culture under glass is ably dealt with, including Vines, Peaches, Nectarines, Figs, Melons, Strawberries, &c., the making of borders, composts for pot fruit trees, manures, diseases, and, under the heading of "Vegetables under Glass," the forcing of Lettuce, Cauliflower, Tomatos, Cucumbers, Asparagus, Beans, Seakale, Rhubarb, &c., &c., are all fully written about. A word of praise is also due to the excellent illustrations, being very typical of what they represent, and assist the reader considerably in understanding the author's instructions. The book is admirably got up, and would be a very acceptable gift to a gardener, as well as a handsome addition to the library. There is a first-rate index to the work.

"The Land of the Blue Poppy: Travels of a Naturalist in Eastern Tibet." By F. Kingdon Ward. 8vo., xii + 283 pp. (University Press, Cambridge, 1913.) 12*s.* net.

There is a fascination and a mystery about Tibet that makes one eager to read of the journeys made by those whose good fortune it is to penetrate into that country of almost unknown peoples. Few Europeans have entered it yet, and though the veil of mystery is rent in places it is still complete enough to obscure the vision, and the fascination remains. Furthermore, the climate is such that we may be certain that the majority of the plants the country holds will prove hardy in England, and it was for these the author went, and he secured seeds of not a few for Messrs. Bees. Some of his new plants have already been figured in our JOURNAL, and several have been seen at our Exhibitions.

The author is, however, not only a botanist, but a geographer of no mean attainments. He is, perhaps, not even first a botanist, and though the descriptions of the vegetation he met with are good, yet the descriptions of the curious conformation of the country he traversed, and of the conditions that so greatly determine the nature of the vegetation, are better still. He found the people friendly, though he travelled in troubled times and along forbidden paths, and most of the trials he had to endure, apart from the discomforts inseparable from travel in an untravelled land, arose from the weather and the deeply-cut gorges which cleave the high plateau which constitutes East Tibet. The journey lay about the upper reaches of the three great rivers Mekong, Salween, and Yang-tze, and its story is told clearly and well, while the illustrations and whole "get up" of the book are admirable.

"Principles and Practice of School Gardening." By Alexander Logan. 8vo., 313 pp., with coloured frontispiece and 102 other illustrations. (Macmillan, London, 1913.) 3*s.* 6*d.*

There are now a number of books dealing with school gardening, and on the whole the one now before us is the best we have seen. From cover to cover it is full of suggestions which cannot but be of the greatest help to the school-garden teacher in arranging his lessons.

As a source of purely horticultural information it will here and there be found wanting, the fruit section being particularly weak. Furthermore, the recommendations are not always in accordance with the best horticultural practice. For example, on page 165, the spring is given as the best time for planting a new strawberry bed, and on page 245 the root pruning of standard trees is talked of. Red Currants are said to fruit similarly to Gooseberries and to require to be pruned in the same way, whereas Red Currants bear entirely upon the spurs and need to be pruned in the same way as Pears, and not in the same way as Gooseberries.

The apple tree represented in figure 84 (reproduced from a Leaflet

of the Board of Agriculture) would seem to us to be a five-year-old *bush* tree. Yet the only reference to it which we can find in the text mentions it as a *standard*.

It is recommended that herbaceous plants should be divided by means of a spade.

The author suggests several fairly complicated manurial experiments. We question the wisdom of this, for in our opinion the problem of manuring is too complex for the school-garden pupil; and even if it were not, the fact remains, as the author himself says, that the available ground in the average school garden "is so small that results can hardly be accepted as conclusive."

In the chapter on plant diseases directions are given as to the way in which potatos showing "irregularly-shaped small wart-like growths of a blackish colour" should be treated before planting. If the scheduled disease caused by *Chrysophlyctis endobiotica* is referred to, as we presume is the case, it surely should have been recommended that tubers which are even suspected of being infected should not be planted. It is not lawful to plant tubers which are *known* to be attacked by this fungus.

Care has obviously been taken to avoid the inaccuracies which unfortunately so often accompany simple language. On page 219, however, it would have been better to have used the word *water*, in place of *sap*, in the passage "for through them" (*i.e.* the leaves) "would pass away as vapour precious *sap*."

The printing and illustrations are both good, and we have no hesitation in recommending this book to all who are interested in school gardens, for it is written upon the right lines.

"School and Home Gardens." By W. H. Meier. 8vo., iv + 319 pp.; 157 figs. (Ginn, London, 1913.) 4*s*.

In his preface the author says: "This book gives definite instruction for arranging, planting, and caring for plants commonly grown in house, yard, or garden." Taking this as his aim, we can safely say that the author has ably achieved what he set out to do. The book contains numerous good illustrations and several interesting planting schemes.

"Agronomy: A Course in Practical Gardening for High Schools." By W. N. Clute. 8vo., xi + 296 pp.; 194 illustrations. (Ginn, London, 1913.) 4*s*. 6*d*.

This is a book which deserves a place in every school library, and will prove of greatest value to the nature-study teacher. We have nothing but praise for it from the teacher's point of view. The practical exercises at the end of each chapter, together with the references to fuller works, are extremely valuable. Chapter 5, on the organization of the plant, is a remarkably good one. The whole of the book is carefully written and is quite worth the money asked for it.

"The Living Plant: A Description and Interpretation of its Functions and Structure." By W. F. Ganong. 8vo., xii + 478 pp. (Holt, New York, 1913.) $3.50 net.

When we saw the name of the author on the title-page of this book, expectations of something out of the ordinary run of botanical text-books were raised, and when we had read the book we laid it down with the feeling that those expectations had in no way been disappointed. The only fault we have to find with the book is concerning the weight of the paper used! The author is a true teacher as well as an accomplished botanist, and his text-book is a presentation of the facts of plant-life at once fresh, accurate, and interesting, and not least among its excellencies is the language, lucid and remarkably free from technicalities.

It is unnecessary to give an epitome of its contents in this brief review, for that the title gives, and all the various life-processes are adequately dealt with and their relations with one another clearly pointed out.

It is a book we can heartily recommend.

"Les Ennemis des Plantes Cultivées." By Georges Truffaut. 8vo., 565 pp. (Truffaut, Versailles, 1912.) Paper covers, 10 fr.

Visitors to the International Horticultural Exhibition at Chelsea will remember the splendid collection of injurious insects, &c., shown by the author, and will be prepared to find in this work, which is based upon and illustrated from that collection, not only a ready guide to the determination of insect and fungus pests, but also a guide as to suitable treatment. The book aims to be a "Traité Complet de Pathologie et de Thérapeutique Végétales," and comes as near to that ideal as is possible within the space given to it.

"Wild Flower Preservation: A Collector's Guide." By May Coley. 8vo., 191 pp. (Unwin, London, 1913.) 3*s.* 6*d.* net.

Notes on collecting, drying, and mounting plants, with a glossary of botanic terms. The print and illustrations, some of which are coloured, are mostly good, but the notes are silent on the preservation of some of those structures that most do torment the collector.

"Plant Life." By Professor J. B. Farmer, F.R.S. 8vo., 255 pp. (Williams & Norgate, London, 1913.) 1*s.* net.

This little book forms No. 72 of the Home University Library. The subject of which it treats is so vast that any attempt to cover it in a single small book, if not actually foredoomed to failure, is at least liable to result in compression so great as to make it difficult for the non-technical reader, for whom we suppose these little books are intended, to gain a clear view of the unity of its theme. That the information contained is accurate it is needless to emphasize, but we hope the editors will see their way to the production of other

books in the series dealing with special parts of the world of plants. Those familiar with plant-life will find many suggestive hints worth following up.

"Submerged Forests." By Clement Reid. 8vo., 129 pp. (University Press, Cambridge, 1913.) 1*s.* net.

Not a little interest attaches to the submerged forests which are so numerous round our coasts, and which occur as well, strangely enough, in the middle of the North Sea, on the well-known Dogger Bank. The reviewer well remembers the interest he felt in examining the moss remains in the "moor log" from this ancient forest, and finding plants not only British but also others confined now to Continental Europe. The author gives an account of these strange relics in a very interesting way, and as only one could who has devoted an immense amount of patient investigation to the remains found in them. Like all the "Cambridge Manuals," this is a reliable and well-written guide to a special branch of knowledge.

"Toadstools and Mushrooms of the Country Side." By Edward Step, F.L.S. 8vo., xvi + 143 pp. (Hutchinson, London, 1913.) 5*s.* net.

One hundred and thirty-five photographic plates, some of them coloured, form the bulk of this book, which is intended for the pocket. Notes descriptive of the fungi illustrated and their near allies, with an account of their habitats and properties, form the letterpress. The book will prove an interesting companion on a ramble in the autumn or winter woods. Only the larger forms of capped fungi are dealt with, and the author promises a further instalment dealing with the puff-balls, earth-stars and so on, if the present one meets the success it certainly deserves. One little criticism we may be allowed to offer. Is it really incumbent on the author to coin "common" names? Is *Amanita spissa* commonly known as "Heavy Toadstool," or *Lepiota excoriata* as "Flayed Parasol," or *Clitocybe phyllophila* as "The Leaf-Lover," or *Russula furcata* as "Fork-gilled Russule"?

"Clay's Successful Gardening." Ed. 5. 8vo., 331 pp. (Clay, Stratford, 1913.) 1*s.* net.

A great variety of gardening matters is dealt with by well-known writers, and much valuable information is given on the growing and showing of all kinds of plants.

"An Introduction to the Chemistry of Plant Products." By P. Haas and T. G. Hill. 8vo., xii + 401 pp. (Longmans, Green, London, 1913.) 7*s.* 6*d.* net.

We are thankful to the authors for bringing together within the covers of one volume the material here collected. All serious students of physiological botany will find it a valuable aid, especially as references are given to the chief literature and bibliographies under each of the groups of substances treated of.

"An Introduction to Plant Geography." By M. E. Hardy, D.Sc. 8vo., 192 pp., 66 figures. (Clarendon Press, Oxford, 1913.) *2s. 6d.*

Although written for upper forms in courses of geography, this book will be useful for those who wish to attain some acquaintance with the more extensive types of vegetation in the world. The author has travelled extensively in many lands, and he gives his own impressions, illustrated by numerous pen-sketches, photographs, and diagrams. The reader is introduced to the main features of such types as equatorial and monsoon rain-forests, various forms of tropical and temperate scrubs, prairies, and deserts, progressing from the rich vegetation of the tropics to the sturdy thrifty plants of the arctic zone. No attempt is made to tackle details, and yet the author presents a wonderfully realistic picture of the conditions under which each type is developed. Sometimes, in avoiding difficult questions, there is a tendency to use phrases not quite strictly botanical, but this is a common fault and not easy to avoid in a comprehensive elementary book. The illustrations are well chosen and full of interest. The influence of vegetation on the races of man is indicated, the slight progress made by man against the rank tropical vegetation, the great promise held out for successful colonization of the sub-tropical, the great development of civilization in regions like the Mediterranean where vegetation is varied, and the poverty of the Arctic zones; these are some of the topics on which one would have liked to hear more.

NOTES ON RECENT RESEARCH

AND

SHORT ABSTRACTS FROM CURRENT PERIODICAL LITERATURE, BRITISH AND FOREIGN,

AFFECTING

HORTICULTURE & HORTICULTURAL SCIENCE.

THE endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural periodical literature, has met with much appreciation. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

There are still, we feel, some departments of Horticulture and Horticultural Science very imperfectly represented in these abstracts, and the Editor would be grateful if any who have time at command, and who are willing to help in any special direction in this work, would communicate with him. He desires to express his most grateful thanks to all who co-operate in the work, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* renders subsequent reference to the original easy. The order agreed on is as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed ; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal, &c., in which the original article appears, taking care to use the abbreviation which will be found on pp. 453, 454.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP IN THIS WORK.

Baker, F. J., A.R.C.S., F.R.H.S.
Ballard, E., F.R.H.S.
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Hartog, Professor Marcus, D.Sc., M.A., F.L.S., F.R.H.S.
Henslow, Rev. Professor Geo., M.A., F.L.S., F.R.H.S., V.M.H.
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Massee, Geo., F.L.S., F.R.H.S., V.M.H.
Newstead, R., A.L.S., F.E.S., F.R.H.S.
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Rendle, A. B., M.A., D.Sc., F.L.S., F.R.S., F.R.H.S.
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Simmonds, A., F.R.H.S.
Smith, William G., B.Sc., Ph.D., F.R.H.S.
Veitch, Sir Harry J., F.L.S., F.Z.S., F.R.H.S.
Voss, W. A., F.C.S., F.R.H.S.
Webster, A. D., F.R.H.S.
Welby, F. A., F.R.H.S.
Whittles, W., F.R.H.S.
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Wilson, Gurney, F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Beiheft zum Botanischen Centralblatt	Beih. Bot. Cent.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Bollettino della R. Società Toscana d' Orticultura	Boll. R. Soc. Tosc. Ort.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Butt. Bot. Dep. Trin.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from U.S.A. Herbarium	Contr. fr. U.S.A. Herb.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr.W.I.
Journal of Agricultural Science	Jour. Agr. Sci.
Journal of Botany	Jour. Bot.
Journal of Chemical Society	Jour. Chem. Soc.
Journal of Economic Biology	Jour. Econ. Biol.
Journal of Economic Entomology	Jour. Econ. Entom.
Journal of Genetics	Jour. Gen.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal of the Society of Chemical Industry	Jour. Soc. Chem. Ind.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
La Pomologie Française	Pom. Franç.
Le Jardin	Le Jard.

Lebensgeschichte der Blutenpflanzen Mitteleuropas	Lebens. d. Blutenpfl.
Mycologia	Mycologia.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.
Oesterreichische Garten-Zeitung	Oester. Gart. Zeit.
Orchid Review	Orch. Rev.
Orchis	Orchis.
Phytopathology	Phytopathology.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Quarterly Journal of Forestry	Quart. Jour. of Forestry.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
Transactions Royal Scot. Arboricultural Soc.	Trans. Roy. Scot. Arbor. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.
† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Abelia floribunda. By D. Bois (*Rev. Hort.* Dec. 1, 1912; p. 544; coloured plate).—A very beautiful shrub, bearing numerous clusters of five or six long, pendent, trumpet-shaped, warm rose-coloured flowers. Native of Mexico, and therefore not hardy, but well adapted for a warm conservatory.—*C. T. D.*

Aechmea spectabilis. By F. Borsos (*Oestr. Gart. Zeit.* vol. viii. pt. iii. pp. 80–82; 2 figs.).—The sword-shaped leaves of *Aechmea spectabilis* attain a length of 3½ feet and end in thorns. The flower stem is 4 feet in length; the panicles are five or six weeks in developing. The carmine-coloured flowers open one by one, and the flowering period lasts two or three months.

This *Aechmea* is propagated from side shoots. It is grown in a mixture of coarse peat, charcoal, coarse sand, loam, sphagnum, and a little coal-dust. Good drainage is necessary and a warm, moist atmosphere (95° F.).—*S. E. W.*

Agave disceptata (*Bot. Mag.* tab. 8451).—Central America? Family *Amaryllidaceae*, tribe *Agaveae*. Succulent under-shrub. Leaves fibrous. Scape 5½ feet high. Flowers on a loose spike. Perianth-lobes greenish, with rosy-purple edges, ½ inch long.—*G. H.*

Agave Haynaldii (*Bot. Mag.* tab. 8481).—Mexico or Central America. Family *Amaryllidaceae*, tribe *Agaveae*. Shrub, rosette with 80 leaves. Leaves 3½ feet long. Inflorescence 23 feet high. Perianth pale yellowish-green, 1 inch long.—*G. H.*

Agave Warelliana (*Bot. Mag.* tab. 8501).—Mexico. Family *Amaryllidaceae*, tribe *Agaveae*. Shrub. Rosette, acaulescent, of seventy-five leaves, 3 feet high. Leaves 29 inches long. Inflorescence 15 feet high. Spike dense, 9 feet high, 14 inches broad. Perianth yellowish-green, mottled with brown or red.—*G. H.*

Akania Hillii (*Bot. Mag.* tab. 8469).—Australia. Family *Sapindaceae*, tribe *Sapindeae*. Tree, 30–40 feet high. Leaves unequally pinnate, 1–2 feet. Leaflets 6–15 on each side, 5–12 inches long, coriaceous, margins spinulose-serrate. Flowers, petals 5, pale rose, subreflexed.—*G. H.*

Alaska (*U.S.A. Exp. Stn., Alaska, Ann. Rep.*, 1910; 85 pages; 13 plates).—This report describes the climatic conditions of the different stations, the agricultural practices suitable to the peculiar conditions, and the work which has been done in raising varieties of corn, fruits, &c., best adapted to this northern country. The range of temperature

at one of them in 1910 is given as −63° F. to + 91° F., and at another −70° F. to + 85° F. (pp. 77–85). Strawberries are being hybridized with the wild *Fragaria chiloensis* of the coastal regions and a number of promising sorts have been obtained, though they are slow in developing (pp. 11–14). After several years of observation it is thought that no apples of any of the varieties now known and cultivated can be successfully grown in any part of the country (p. 20). The cultivation of the cherry and plum, too, is not hopeful in the open, but the currant, gooseberry, and raspberry thrive and fruit as well as anywhere on earth (p. 23). The wild raspberry has been found in abundance within a degree of the Arctic circle. Of the cereals, barley is the most promising up to the present, and the raising of new varieties is in progress, the ideal being a variety which, in addition to other good qualities, will mature fully in 90 days between seed-time and harvest. In 1910 there were only 84 days between killing frosts in spring and fall (p. 30). Barley is considered to have a wider field of usefulness than oats in these latitudes, though several varieties of these are being tested with good results, especially North Finnish Black.

Alaskan soils yield but a limited supply of available plant food, and soon become exhausted. Animal manure of any sort is scarce, and the cost of artificial manures in the interior is almost prohibitive (p. 38). The solution suggested is summer fallowing alternate years and green manuring, combined with the application of such manures as can be obtained.—*A. P.*

Albuminoids and Invertase. By Sergius L. Ivanow (*Beih. Bot. Cent.* Bd. 29, Abt. 1, Heft 1, pp. 144–158).—The author tested plants, both when in the resting winter state and in flower, for the presence of peptolytic ferments and invertase.

The seeds of *Brassica Napus oleifera* gave a negative result. No reaction for peptolytic ferments was found in any of the plants tested when in the resting state (seeds, buds, leaves, rhizomes, or whole plants such as *Lemna*, *Sedum album*, 'Cactus,' *Polytrichum*, and Lichens). Invertase was not found in Lilac and Mistletoe buds, in leaves of *Pinus* and *Agave*, and in rhizomes of *Convallaria* and *Iris germanica* but occurred in Coltsfoot rhizomes, *Lemna*, and *Sedum album*.

When germinated plants were used peptolytic ferments were found in Flax seedlings,* Cucumber,* Sunflower,* *Lathyrus*.* and *Phaseolus* seedlings, also in flowering plants of Hyacinth, *Crocus Scilla*, Tulip,* *Gagea*,* *Agave*,* and *Phyllocactus*,* but not in *Viola*,* *Asarum*,* *Anemone*,* Hellebore,* Shepherd's Purse,* *Chelidonium*, *Lemna*,* and *Pulmonaria* *; nor in the developed buds of *Lonicera*,* and *Sambucus*,* nor in roots and rhizomes (*Paris*, *Polygonatum*, *Arum*, *Phyteuma* *), nor in the aerial parts of *Paris*, *Polygonatum*,* *Arum*, and Rye.*

But these ferments occurred in *Agaricus*, ripening seeds and fruits of *Carica papaya*, though not in those of *Rhododendron*, *Cucumis*,* and *Citrus*.* *Lunularia* gave no reaction.

Those marked * also showed invertase.—*G. F. S. E.*

Alkali Land, The Choice of Crops for. By Thomas H. Kearney (*U.S.A. Dep. Agr., Farm. Bull.* 446; May 1911).—One of the most serious obstacles to agriculture in the arid portions of the United States is the frequent presence in the soil of an excess of readily soluble alkali salts, and it is estimated that one-tenth of the irrigated land in the west contains an injurious quantity. Very few useful plants can be depended upon to grow where more than 1·5 per cent. of the dry weight of the soil consists of alkali salts, among these being members of the goosefoot family (Chenopodiaceae), salt-grass (*Distichlis spicata*), and sugar beets, the latter being able to grow in the presence of as much as 2·5 per cent., though the roots thus produced are small, the sugar content low, and the ash content of the juice high (p. 13). The date palm is the only fruit tree which can be expected to yield fruit of good quality when there is as much as 1·5 per cent. of alkali in the soil. Where the content is less than 1 per cent. most of the ordinary farm crops can be grown with varying degrees of success if the surface soil is relatively free at the time of seeding, as, for instance, soon after heavy rains (p. 11). These percentages apply only to what are known as white alkali salts (such as sodium sulphate, chloride, and bicarbonate), as little as ·05 per cent. of black alkali (sodium carbonate) being too much for good crop production with most species (p. 8). For land that is being reclaimed by flooding the sorghums are considered the most satisfactory crop to grow during the process (pp. 16, 20).

A. P.

Aloe africana, Mill. By H. Strauss (*Gartenflora*, vol. lxii. pt. vii. pp. 137–138; 1 coloured plate).—*Aloe africana* closely resembles *A. pluridens*, but differs from it by having yellow flowers with green stripes. It is a native of south-east Cape Colony, and is found on the coast.—*S. E. W.*

Aloe Marlothii (*Bot. Mag.* tab. 8434).—South Africa. Family, *Liliaceae*, tribe *Aloineae*. Shrub, succulent. Leaves 1¾ foot long. Peduncle 3 feet high. Flowers secund, 1½ inch long, yellow outside, striped with green.—*G. H.*

Aloe Steudneri (*Bot. Mag.* tab. 8448).—Eritrea and Abyssinia. Family *Liliaceae*, tribe *Aloineae*. Herb, succulent. Leaves in a rosette a yard across, 2 feet long. Inflorescences, two from same crown, 6–10 inches long. Perianth pieces 2 inches long; three outer, deep red; three inner, rose-pink below, dark yellow at the tip.—*G. H.*

Alpines. By A. C. Baumgartner (*Oestr. Gart. Zeit.* vol. vii. pt. xii. pp. 441–455).—Part I., A Monograph of the Saxifrages.—*S. E. W.*

Amelanchier oligocarpa (*Bot. Mag.* tab. 8499).—North America. Family *Rosaceae*, tribe *Pomeae*. Shrub, usually dwarf, rarely 5 feet high. Leaves oblong, 1½–2 inches long. Flowers, 1–3 to a shoot. Petals white.—*G. H.*

Amelanchier spicata, Abnormal Flowers of. By J. J. Clark (*Ann. Bot.* vol. xxvi., July 1912, pp. 948, 949).—A case is recorded of the petals of *Amelanchier spicata* becoming staminoid. Double flowers resulting from the petalody of the stamens is frequent enough in Rosaceae, but the reverse is unusual. The petals in the specimens described show more or less infolding of their lateral margins, and in extreme cases developed at their tips anthers in which pollen-grains were found. The flowers were abnormal in some other respects.

A. D. C.

American Blight (*Schizoneura lanigera*). By W. W. Froggatt (*Agr. Gaz. N.S.W.*, vol. xxiii. pp. 520–528).—American blight or woolly aphis attacks the roots and the branches of apple trees. Treatment of the diseased trees with carbon bisulphide is not advised, as the trees are not protected from future attacks and may be injured. A better plan is to lay bare the roots in a circle of two feet from the trunk, scrape the galls on the roots, spread three pounds of waste tobacco over the exposed roots, fill in with earth and pour a bucket of water on the trunk, or instead of tobacco drench the roots with kerosene emulsion. To clean the branches, fumigate with hydrocyanic acid at intervals of six weeks, or spray with red oil or kerosene emulsions. On the small scale paint with castor oil or raw linseed oil.

S. E. W.

Amorphophallus corrugatus (*Bot. Mag.* tab. 8475).—Siam. Family *Aroideae*, tribe *Pythonieae*. Herb, tuberous. Leaf solitary; petiole 1½–2 feet long, dirty-green with tawny blotches; blade 3-partite. Peduncle 10–22 inches long. Spathe erect, 3–6 inches long, hooded, green and mottled with white, margins purple. Spadix, female portion tawny-purple, male portion rose; appendix corrugated, ochre-yellow.—*G. H.*

Anemones and Ranunculus (*Rev. Hort.* Sept. 16, 1912; p. 414).—It has been found that the dormant roots of these, if kept under such dry conditions as to prevent growth at the normal season, may, after the period of rest is long over, be planted and will grow and flower at practically any desired season, while the flowers are finer and more double than when planting is done under the ordinary conditions. The Dutch make a speciality of these retarded roots.—*C. T. D.*

Apple Blister Canker and Methods of Treatment. By W. O. Gloyer (*U.S.A. Exp. Stn., Ohio, Cir.* 125).—Apple Blister Canker is due to the attacks of *Nummularia discreta*. It is a serious disease of apple trees in the United States, and has also been reported on *Magnolia* and *Sorbus*.

It was first described in America by Schweinitz in 1834 and was known in France in 1863.

Large cankers appear on the limbs and trunks of apple trees, the heart-wood becomes discoloured, the epidermis peels off, exposing the tan-coloured stromata of the fungus.

Two kinds of spores are known, conidia given off from more or less branched conidiophores, which grow out from the stromata the first year, and asci containing black ascospores which are formed in the stromata the following April–June.

The fungus is a wound parasite.

The preventives suggested in this circular are :—

(i.) Burn all diseased wood.

(ii.) Prevent cut surfaces from drying out by applying asphaltum or some other substance which will form a layer over the surface.

(iii.) Spray trunks and large branches as well as leaves and branches when spraying for scab.

(iv.) Grub up badly diseased trees. It is not sufficient to cut them down, as the fungus can spread to the roots, but cannot form stromata below the surface of the soil.—*D. M. C.*

Apple Leaf Spot (*Jour. Bd. Agr.* vol. xx., No. 6, pp. 513–515 ; plate).—The disease caused by *Sphaeropsis malorum*, Peck, which attacks the leaves, fruits, and branches of apples, pears, and quinces, is described, and preventive measures are suggested.—*A. S.*

Apple, Powdery Mildew of (*Podosphaera leucotricha*). By C. F. Cole (*Jour. Agr. Vict.*, Sept. 1912).—If discovered in its early stage, spray at once with Bordeaux mixture or lime-sulphur wash. If in an advanced stage, cut away diseased parts and burn, following by spraying with either of the already-named fungicides. Flowers of sulphur or freshly slaked lime will destroy this pest if dusted on as soon as detected in its early stages of development.—*C. H. H.*

Apple Trees, Spraying of. By J. Hughes (*Agr. Gaz. N.S.W.* vol. xxiii. pp. 719–722).—When spraying for woolly aphis with red oil, mix with hot water and use warm. Apply immediately the leaf has fallen, and again just before the tree breaks into bud For codling moth spray with lead arseniate when 90 per cent. of the blossom has fallen. Repeat three and seven weeks respectively after the first application.—*S. E. W.*

Asparagus. By R. W. Peacock (*Agr. Gaz. N.S.W.*, vol. xxiii. pp. 707–712 ; 4 figs.).—Asparagus does best on sandy loam, rich in vegetable matter, in a sunny position. An annual dressing of well-rotted farmyard manure in autumn is necessary. Old-established roots may be cut for ten weeks. When the cutting is finished, apply 250 lb. sodium nitrate, 400 lb. superphosphate, and 150 lb. potassium chloride to the acre. Common salt is little used by commercial growers.—*S. E. W.*

Aster Purdomii (*Bot. Mag.* tab. 8476).—China. Family *Compositae*, tribe *Asteroideae*. Herb, 6 inches high. Leaves radical, ovate-elliptic, $1\frac{1}{4}$–$1\frac{1}{2}$ inch long. Flower-head $2\frac{1}{2}$ inches across. Ray-florets about 40, pale violet. Disk-florets pale yellow.—*G. H.*

Avocado in Hawaii. By J. E. Higgens, J. Hunn, and V. S. Holt (*Hawaii Exp. Stn., Bull.* 25 ; Dec. 16, 1911 ; plates).—Among tropical fruits the taste for which in temperate climates is rapidly increasing is the Avocado (*Persea gratissima*), sometimes, but inaccurately and rather unfortunately, called the Alligator Pear.

This is an account of the growing importance of the cultivation of this fruit in Hawaii, and of all the processes of rearing, propagating, and cultivating the tree and of gathering, grading, and marketing the fruit. A descriptive list of some varieties now being tested in Hawaii and on the mainland is given, and some recipes are added for the preparation of the fruit for the table.—*M. L. H.*

Begonia, A Bisexual "Gymnospermous." By R. A. Dümmer (*Ann. Bot.* vol. xxvi., Oct. 1912, pp. 1123, 1124).—Records the occurrence of a bisexual flower of *Begonia semperflorens* var. *gigantea*. The gynœcium was entirely superior and the ovaries wholly exposed owing to the disappearance of the protecting ovary wall. The stamens originated from the base of the ovuliferous lamellæ, and in some cases were fused with the styles.—*A. D. C.*

Begonia boliviensis sulphurea. By Ferd. Cayeaux (*Rev. Hort.* May 1, 1913 ; pp. 200–202 ; 4 illustrations).—An account of the origin, so far as traceable, of this Begonia species, which is of somewhat dwarf habit, very floriferous, and with yellow flowers. Possibly of value for hybridization, but, curiously enough, its multitude of flowers appear to be nearly all males, the few exceptions being imperfect, and so far producing no seed. Crosses have, however, been effected ; 'Clair de lune,' between it and an unnamed tuberous Begonia, and *B.* × *bolidavis*, *B. Davisii* × *B. boliviensis sulphurea*, very floriferous and of an orange colour, suited for border planting.—*C. T. D.*

Begonia, 'Lena' and others suitable for suspended Baskets. By E. Laumonnier-Ferard (*Rev. Hort.* Feb. 1913 ; 1 illustration and coloured plate).—'Lena' is an extremely handsome, floriferous, tuberous plant, with large, pendulous, deep crimson double flowers, 3 inches or more in diameter. A descriptive list of others is given.
C. T. D.

Berberis verruculosa (*Bot. Mag.* tab. 8454).—China. Nat. Ord. *Berberidaceae*, tribe *Berberideae*. Shrub, evergreen, 3–4 feet high. Flowers yellow. Berry purplish-blue, pruinose.—*G. H.*

Birds, The Food of Nestling. By W. E. Collinge (*Jour. Bd. Agr.* vol. xix., No. 6, pp. 460–465).—"Practically all birds, excepting doves and pigeons, feed their young upon an animal diet, whatever may be the character of the food of the adult." The present article consists mainly of observations bearing upon the quantity and nature of the food of the young of the starling, house sparrow, song thrush, and blackbird. When it is "remembered that the nestling season is

also that when the destruction of injurious insects is most needed—that is, at the period of greatest agricultural activity and before the parasitic insects can be depended upon to reduce the pests "—it becomes apparent that " the nature of the food, the amount consumed, and the relation this bears, from an economic standpoint, to the harm done by some species when adult, is not solely a question of interesting curiosity on the part of the bird-lover, but one that has a definite bearing on the success or failure of the produce of the land."—*A. S.*

Broad Bean, Black Fly of. By F. V. Theobald (*Jour. Bd. Agr.* vol. xix., Nos. 6, 11, pp. 466–476, 914–922).—The Black Fly, " Blight," or " Collier " of broad beans (*aphis rumicis*, Linn.) appears to originate from winter eggs on docks, to which the aphides seem to pass regularly each autumn.

On the other hand, the aphis which attacks mangolds and other members of the Chenopodiaceae, and which is regarded as belonging to the same species (*A. rumicis*), seem to winter upon spindle trees (*Euonymus europaeus*). In the summer it passes from the spindle trees on to field poppies, and thence on to mangolds, and in the autumn it returns to the spindle trees.—*A. S.*

Cabbage. By L. C. Corbett (*U.S.A. Dep. Agr., Farm. Bull.* 433 ; April 1911 ; 11 figs.).—This deals with the cultivation of the cabbage both as a market-garden, and as a farm crop, the methods to be adopted in the north differing widely from those found successful in the south. The subject of winter storage is also dealt with.—*A. P.*

Cacti, Ornamental. By Charles Henry Thompson (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 262 ; Dec. 1912 ; plates).—Some practical hints on the cultivation of Cacti, compiled by the botanist in charge of the Succulent Collection in the Missouri Botanical Garden, St. Louis, for the benefit of the American amateur. Though Cacti are, with the exception of a few species of *Rhipsalis*, strictly indigenous to the Western Hemisphere, it is only lately that much interest has been taken in their cultivation there. All the available manuals have been written with a view to European conditions, and are not entirely applicable to America. This bulletin describes the propagation of Cacti from seed, vegetative reproduction, grafting, and gives advice on culture and the treatment and prevention of diseases.

The writer enumerates the uses of the Cactus, in many species as a fruit-bearing plant ; the ornamental work which may be made of the woody core of a few ; its adaptability as a hedge plant in climates where it can live out of doors all the year, and its decorative value.

He concludes with a list of practically all the varieties now cultivated in America under the following heads :—

1. Columnar forms of Cacti (over 6 feet, from 1 to 2 feet, less than 1 foot high).

2. Globose forms (more than 1 foot in diameter, from 3 inches to 1 foot in diameter, less than 3 inches).

3. Platyopuntias and Nopaleas (tall, medium, and decumbent).
4. Cylindropuntias (tall, medium, and prostrate).
5. Foliage-bearing Cacti (climbing and shrubby).
6. Climbing night-blooming forms of *Cereus*.
7. Plants native to moist Tropical Regions (terrestrial and epiphytic).—*M. L. H.*

Calanthe Siebertiana. By R. Schlechter (*Orchis*, vol. vii. pt. iii. pp. 35–37; 1 plate).—The hybrid obtained by fertilizing *C.* × *Veitchii* with *C. cardioglossa* bears flowers which resemble *C.* × *Veitchii* in form, colour, and size. The labellum is broader and beautifully marked.—*S. E. W.*

Calanthe sylvatica. By R. Schlechter (*Orchis*, vol. vii. pt. i. pp. 4, 5; 1 coloured plate).—*Calanthe sylvatica*, from Madagascar, resembles *C. natalensis*. It thrives in a compost of loam, sand, and leaf mould in a warm greenhouse.—*S. E. W.*

Calypso bulbosa, Rch. By G. E. F. Schulz (*Orchis*, vol. vi. pt. vi. pp. 95–99; 3 plates).—*Calypso bulbosa*, better known as *C. borealis*, "the Pearl of the Arctic Circle," is found on either side of the Arctic Circle in Europe, Asia, and America, more particularly in the island of Vancouver—growing in old fir forests, where it is buried in snow in winter, provided with copious supplies of water when the snow melts, and is dust-dry later in the year.

The flower is as beautiful as the Lady's Slipper; the edge of the slipper is white or pale lilac, the body red-brown, and the remaining petals are lilac. The cultivation of this orchid presents many difficulties.—*S. E. W.*

Capoc-yielding Cotton-wool Trees of the German Colonies in Tropical Africa. By E. Ulbrich (*Not. König. Bot. Berlin*, vol. vi. no. 51, pp. 1–34; April 1913; with 4 text figures).—Capoc, a name originally applied to a particular cotton-wool-bearing tree, is now employed to signify the product of the tree, viz., the wool from the interior of the capsules of *Ceiba* and some species of *Bombax*.

Lower India, and especially Java, has long been the chief locality from which capoc is derived. More recently Togo and German East Africa have also furnished a supply of capoc. The cotton-wool trees are often very tall, sometimes attaining a height of 60 metres; their trunks are usually unbranched in the lower part, the wood is brittle, and the branches usually bear spines. These characters make the gathering of fruit-capsules from the tree difficult, and in the case of the wild-growing trees it is necessary to wait until the capsules fall to the ground. Where the tree is cultivated, it is usually pollarded when it becomes too high, and finally cut right down and cuttings planted afresh.

In planting cuttings branches are selected which are about as thick as a man's arm, and these are planted 1–1½ metre deep in the ground and the leaves removed. These soon strike and usually grow

into spineless trees. No fungal disease of any practical significance is known to attack these trees, but several insect pests do considerable damage at times, and some species of Loranthaceae cause considerable trouble in Java.

Capoc wool is not suitable for spinning, but it is of much use for packing pillows, mattresses, and especially swimming-belts and other such life-saving apparatus. It possesses great buoyancy, is wetted with difficulty, and is very resistant to the influence of sea-water.—*R. B.*

Carbonic Acid, Feeding Plants with. By H. Fischer (*Gartenflora*, vol. lxi. pt. xiv. pp. 298–307).—Plants grown in an atmosphere enriched with carbonic acid develop rapidly, flower freely, and resist the attacks of pests. The treatment is carried on in a greenhouse or glass case in bright weather; the gas is generated by the action of hydrochloric acid (strong acid mixed with an equal volume of water) on marble or limestone, using half an ounce of marble and 1¼ to 2 cubic inches of the diluted acid for each square yard occupied by the plants. The vessel containing the mixture must be raised above the ground, and the house closed for one hour. The operation may be repeated twice daily. The carbonic acid may also be prepared by burning small quantities of spirits of wine.—*S. E. W.*

Carludovica atrovirens. By P. Jancke (*Gartenflora*, vol. lxi. pt. xxiii. p. 526; 1 fig.).—*Carludovica atrovirens* is found in the forests of tropical America. It attains a height of 4 feet, succeeds in the hothouse in a mixture of loam and peat, and likes plenty of water.—*S. E. W.*

Carnations, Henri Vacherot's Strain. By Henri Vacherot (*Rev. Hort.* Oct. 16, 1912; p. 471; 1 illustration and coloured plate).—Both plates illustrate a very fine strain, claimed to be distinguished by long stalks, floriferousness, hardiness, not dainty as to soil, and requiring no disbudding. Shown to advantage at Holland Park after a journey and nine days' persistence. Silver cup at International Exhibition.—*C. T. D.*

Carnations, History of Garden. By E. M. Kronfeld (*Oestr. Gart. Zeit.* vol. vii. pt. vii. pp. 241–251, pt. viii. pp. 285–294, pt. ix. pp. 332–340, pt. x. pp. 362–389, pt. xi. pp. 405–415; 31 figs., 1 col. plate).—The carnation (*Dianthus Caryophyllus*) was a rare flower in Britain and Germany in the middle of the fifteenth century; its native habitat was probably the African coast of the Mediterranean. The author points out frequent allusions to this flower in literature, and numerous representations of it in art.—*S. E. W.*

Catalpa, Wood Rots of. By N. E. Stevens (*Phytopathology*, ii. p. 114; June 1912; plates). — It has been stated that saprophytic fungi never attack the wood of the Catalpa, but the author shows that this statement is erroneous, and that *Polystictus versicolor* is particularly bad, and *Schizophyllum commune*, *Polyporus adustus*, and *Stereum albobadium* also attack the same wood.—*F. J. C.*

Cattleya gigas. By R. Gaveau (*Orchis*, vol. vi. pt. vi. pp. 103–104).—*Cattleya gigas* is a shy bloomer. To induce it to flower give plenty of light and air, and keep the plants rather dry. Early growth must not be encouraged.—*S. E. W.*

Cattleya nobilior. By O. N. Witt (*Orchis*, vol. vii. pt. iv. pp. 51–55; 1 plate).—*C. nobilior* flowers much more freely than *C. Walkeriana*: the bulbs generally bear two leaves. The flowers have a uniform deep violet colour, and are borne on a long stem. If the Orchid is kept moderately dry at the time when it is about to produce bulbs, it develops a short flower stem on the leaved bulbs, and is identical with *C. dolosa*. The latter is not a distinct variety.

S. E. W.

Cauliflower and Cabbage Cultivation. By A. J. Pinn (*Agr. Gaz. N.S.W.*, pp. 1059–1075; 9 figs.).—The ground in which cabbages and cauliflowers are grown requires frequent supplies of farmyard manure. In addition, 3 cwt. to the acre of the mixture of bone dust (9 cwt.) and potassium sulphate (1 cwt.) is applied when sowing or planting out, and a dressing of ammonium sulphate ½ cwt., potassium sulphate ½ cwt., and ¾ cwt. superphosphate is given before the heads begin to form. The black rot of cabbage (*Pseudomonas campestris*) is propagated in the seed. It is advisable to dip the seed in a mixture of formalin (1) and water (320) for 20 minutes prior to sowing.

In districts where club root (*Plasmodiophora brassicae*) is prevalent, lime the ground and do not grow cabbages on the same plot more than once in three years. Cabbage, kale, rape, turnips, or radishes should not be grown in succession.

The caterpillars of the diamond-backed cabbage moth are killed by an application of boiling water from a watering-can, spraying with kerosene emulsion, or sprinkling with a mixture of dry lime (4 pints) and tobacco dust (1 pint).

Spray with tobacco and soap wash or kerosene emulsion, or dust with soot or lime, to destroy cabbage aphis. Caterpillars are got rid of by feeding with a mixture of bran, treacle, and Paris green.

S. E. W.

Ceropegia Thorncroftii (*Bot. Mag.* tab. 8458).—Transvaal. Family *Asclepiadaceae*, tribe *Ceropegieae*. Herb, twining, perennial. Leaves 1–2½ inches long. Corolla white, with purple blotches.—*G. H.*

Chamaedorea. By P. Jancke (*Gartenflora*, vol. lxi. pt. xv. pp. 326–327; 1 fig.).—A hybrid, *Chamaedorea concolor* × *Ch. Ernesti Augusti*, resembles *Ernesti Augusti* in growth and durability, and *concolor* in the arrangement of its leaves.—*S. E. W.*

Chamaedorea. By H. Koehler (*Gartenflora*, vol. lxii. pt. ix. pp. 197–200; 6 plates).—The varieties of *Chamaedorea* are very

useful for house decoration. They are raised from seeds which are ten to twelve weeks in germinating, in a temperature of 53° to 60° F. *C. elegans* is perhaps the best worthy of cultivation. Several hybrids have been obtained, e.g. *C. corallina* × *elatior*, *elegans* × *concolor*. The hybrids resemble the male parent.—*S. E. W.*

Chamaedorea glaucifolia (*Bot. Mag.* tab. 8457).—Colombia? Family *Palmae*, tribe *Areceae*. Shrub, stem slender, 15 feet. Leaves, ascending, leaflets forty, linear-lanceolate. Panicles, male, 16 inches. Corolla 2½ inches long. Fruit globose, ¼ inch diameter, black, polished. —*G. H.*

Chestnut, The Bark Disease (*U.S.A. Exp. Stn., W. Virg., Bull.* 137). This bulletin is chiefly a summary of all available publications on the subject of the dangerous bark disease of chestnuts due to *Diaporthe parasitica*, which is causing such damage in the United States.—*D. M. C.*

Chironia laxa (*Bot. Mag.* tab. 8455).—South Africa. Family *Gentianaceae*, tribe *Chironieae*. Herb, glabrous. Stems laxly branched. Leaves ¾–1 inch long. Flowers showy, usually 2–3, or solitary, terminal. Corolla pale magenta, 2–2½ lines across.—*G. H.*

Cicadas. By W. W. Froggatt (*Agr. Gaz. N.S.W.* vol. xxiv., pp. 341–344; 3 figs.).—In the neighbourhood of Sydney much damage has been done to the bark of Peach and other trees by cicadas (*Melampsalta incepta*).—*S. E. W.*

Cissus Species, Growth of the Aerial Roots of a. By Dr. A. H. Blaauw (*Ann. Jard. Bot. Buit.* ser. ii. vol. xi. pt. ii. pp. 266–293, 1912; two text figs.).—*Cissus pubiflora* var. *papillosa* grows high up on the trees in the primeval forests round Tjibodas. Its aerial roots, sometimes 20–30 metres in length, reach down to the ground, and after a time emit lateral branches which root into the soil. These rapidly-growing roots appeared to be favourable objects upon which to study the phenomenon of growth. The root apices were carefully marked with small dots of a black pigment which would not wash away with the rain. It was found that the total growth of a root during a day averaged about 7 cm. This would imply (if the conditions remained constant) that such a root would grow 20 metres in ten months.

Growth is most marked at the apex of the root, and gradually lessens from point to point behind this. This falling off of growth is not regular, however, and there is no single zone of maximum growth to be observed.

Growth is much slower during the day than in the night. Between the hours of 4 P.M. and 8 A.M. twice the growth takes place in the zone 0–10 cm., and three times the growth in zone 10–20 cm., compared with that which is observed in these regions during a similar period of time

in the daytime. This difference between the growth which takes place during the day and the night cannot be attributed to the influence of light and darkness respectively, as experiments showed very little effect upon the growth when the roots were artificially darkened. Most probably the higher transpiration during the day determines the slower growth of the roots. No well-defined negative or positive phototropism or geotropism is exhibited by these roots.—*R. B.*

Cistus × Loreti (*Bot. Mag.* tab. 8490).—Garden origin. Family *Cistaceae*. Cross between *C. ladaniferus* and *C. monspeliensis*. Shrub, 4 feet high. Leaves 2¼ inches long. Inflorescence umbellate, 3–4 flowered. Petals 5, 1¼ inch across, white, with yellow basal spot. *G. H.*

Citrus, A Knot of Citrus Trees caused by Sphaeropsis tumefaciens. By Florence Hedges and L. S. Tenny (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 247).—Knots caused by the fungus *Sphaeropsis tumefaciens* occur on orange, pomelo, lemon, tangerine, and *Citrus trifoliata*. Affected branches are girdled by the tumours, and the branch above the knot ultimately dies. Knots appear in any season regardless of weather conditions, and trees of all ages are attacked.

There is no external evidence of the fungus, but microscopical examination shows the presence of mycelium in all the different tissues of the stem, producing black areas if present in abundance.

The pycnidia, as they have been observed in the host, are subglobose, papillate, dark brown or black, ostiolate, closely crowded together or solitary. They are at first covered by the epidermis but finally break through the epidermis. The pycnospores are large yellowish or colourless, and variable in size. Spermatia occur in the pycnidia or in separate spermagonia, but their germination has never been observed. The disease can spread from tree to tree, and the author recommends the burning of all diseased tissue, and the careful selection of sound trees for grafting purposes.—*D. M. C.*

Citrus Fruits, Diseases of. By P. H. Rolfs, H. S. Fawcett, B. F. Floyds (*U.S.A. Exp. Stn., Florida, Bull.* 108; Nov. 1911).—Various diseases of citrus fruits are described, also injuries due to spraying and wrong treatment.

Of the fungoid diseases two stem-end rots, *Phomopsis* sp. and *Diplodia natalensis* (which cause great loss by dropping of the fruit), the black rot inside the fruit at the stem end, and a third black rot at the blossom end seem to be serious.

During transit and in storage *Penicillium italicum* and *Penicillium digitatum*, both wound parasites, are answerable for considerable damage and loss.

Methods of control are given when known.—*D. M. C.*

Citrus Fruits, The Cause of Stem-end Rot of. By H. S. Fawcett (*Phytopathology*, ii. p. 109; June 1912; 2 plates).—Dark brown, reddish-brown, or black discoloration appears about the base of the fruit, which has usually fallen previously. The rotting often proceeds after packing. The fungus causing the rot is a new species named *Phomopsis citri*, and has been isolated and infection experiments carried out with it.—*F. J. C.*

Citrus Scab. By H. S. Fawcett (*U.S.A. Exp. Stn., Florida, Bull.* 109; May 1912).—Citrus scab is caused by *Cladosporium citri*. It attacks sour oranges and lemons badly, but only disfigures tangerines, grape-fruit, and rarely sweet orange.

It can be prevented by removing all sour orange or lemon sprouts, by pruning all scabby young growth, and by spraying with ammoniacal copper carbonate in bad attacks.—*D. M. C.*

Clerodendron Bakeri (*Bot. Mag.* tab. 8474).—W. Tropical Africa. Family *Verbenaceae*, tribe *Viticeae*. Shrub, 4 feet high. Leaves oblong-elliptic, $3\frac{1}{2}$–8 inches long. Cymes densely many-flowered. Flowers white, $\frac{3}{4}$ inch across. Fruit black.—*G. H.*

Cocculus trilobus (*Bot. Mag.* tab. 8489).—Eastern Asia. Family *Menispermaceae*, tribe *Cocculeae*. Shrub, climbing. Leaves petiolate, blades ovate, 2–$3\frac{3}{4}$ inches long. Cymes 1-sexual, green. Drupes, 2–4 to each flower, subglobose, $\frac{1}{4}$ inch diameter, blue-black. *G. H.*

Coelogyne cristata (*Bot. Mag.* tab. 8477).—Temperate Himalaya. Family *Orchidaceae*, tribe *Epidendreae*. Herb, epiphytic. Leaves lanceolate, 5–12 inches long. Scapes 6–8 inches long, racemes 5–7 flowered. Flowers white, the lip with yellow crest.—*G. H.*

Coelogyne elata. By E. B. Behnick (*Orchis*, vol. vii. pt. ii. pp. 24–25; 1 plate).—This decorative orchid is found in Nepal, Sikkim, and Sarjeetal from 3700 to 6000 feet above sea level. The flowers are white, with orange markings on the lip.—*S. E. W.*

Coelogyne Lawrenceana. By E. Miethe (*Orchis*, vol. vii. pt. iv. pp. 58–59; 1 plate).—This beautiful Orchid comes from Annam, and is grown in a temperate house. The flowers are borne on slender stems. The petals and sepals are pale greenish-yellow; the large lip is orange, passing to brown, but white in front.—*S. E. W.*

Coffee. By T. B. McClelland (*U.S.A. Exp. Stn., Porto Rico, Ann. Rep.*, 1911, pp. 28–30).—As coffee seed does not long keep its viability, experiments were made to see if it might be longer preserved by excluding the moist air of the tropics. The conclusions arrived at were that the viability of coffee seed is destroyed by very severe drying, and that a certain amount of moisture as yet undetermined is necessary for its prolongation.—*A. P.*

Columnea glabra (*Bot. Mag.* tab. 8453).—Costa Rica. Nat. Ord. *Gesneriaceae*, tribe *Cyrtandreae*. Shrub, to 2 feet high, branching above. Leaves clustered towards the ends of the twigs, 1–1¼ inch long. Flowers solitary in the upper axils; corolla, 3 inches long, scarlet.—*G. H.*

Copper Sulphate, Sale of Impure (*Jour. Bd. Agr.* vol. xx., No. 2, pp. 133–134).—A note on the adulteration of copper sulphate with iron sulphate. The presence of the latter substance in copper sulphate may be readily determined by dissolving a small quantity in water and adding ammonia, the solution being constantly stirred until a deep blue liquid is formed. Any quantity of brown flecks floating in this blue liquid indicates the presence of so much iron that the copper sulphate should be subjected to a proper analysis before use. The desirability of obtaining a guarantee of 98 per cent. purity from the seller is pointed out.—*A. S.*

Cornus controversa (*Bot. Mag.* tab. 8464).—Himalaya and E. Asia. Family *Cornaceae*, tribe *Corneae*. Tree, 30–40 feet high. Leaves ovate-elliptic, 3–6 inches long. Inflorescence corymbose, 7 inches wide. Flowers white.—*G. H.*

Cotton, Egyptian, The Branching Habits of. By Argyle M'Lachlan (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 249; Sept. 20, 1912; plates).—That the cotton plant produces two distinct types of branches which are variously developed in the different varieties and types of cotton and under different conditions of growth has been known for several years. The excessively large size of the vegetative branches on Egyptian cotton plants grown under irrigation in the Colorado River Valley in Arizona and California occasions difficulties in cultivation and harvesting, and causes the development of normal fruiting branches to be postponed. This paper gives the results of a study of the subject undertaken with the view of establishing the possibility of cultural control of the production and development of either vegetative or fruiting branches. The matter is still in the experimental stage, but a method of recording branching habits of cotton by means of diagrams has been devised. The diagrams show the position of branches, the development of fruiting branches and the stature of plants, and promise to be of value as records in the cultural and breeding study of cotton.—*M. L. H.*

Couch Grass, Poisonous. By J. H. Maiden (*Agr. Gaz. N.S.W.*, vol. xxiii. pp. 295–296; 1 plate).—Blue couch grass (*Cyanodon incompletus*) sometimes contains hydrocyanic acid and is poisonous. Its culms have two or three nodes; the ligule is membranous and the rachilla not produced. The non-poisonous couch grass (*C. Dactylon*) has many noded culms, with the leaves crowded at the base; ligule a ciliate rim; rachilla produced.—*S. E. W.*

Cowpeas Growing in Missouri. By M. F. Miller (*U.S.A. St. Bd. Hort. Missouri*, vol. x., no. 1 ; Jan. 1912 ; plates).—It is pointed out that the cowpea is a plant that is not sufficiently appreciated by the Missouri farmer. Its value as a soil renovator, as a green manure crop, as a catch crop, as a pasture and as a regular hay crop, gives it a place in Missouri agriculture which warrants its wide acceptance by farmers. Its wide adaptation to the soils and to the climatic conditions common to Missouri make it a crop that can be readily grown in practically every part of the State, and there is little doubt that its use is destined to a great increase. Certain drawbacks have hitherto kept it from taking the place it deserves. Among these are the high cost of the seed and the difficulty in curing the hay. The gradual introduction of cowpea shellers that will release the peas without cracking them will undoubtedly overcome the first of these difficulties to a considerable extent, while proper methods of handling the hay will in a great measure do away with the latter drawback. The writers' assertions are backed up by articles contributed by other experts on the value of the cowpea in building up the soil, on the feeding value of the cowpea, &c., and directions are given for the preparation of the soil, on the order of the cowpea in a rotation of crops, and for its cultivation.

The bulletin ends with a short note on the soy-bean.—*M. L. H.*

Crown Gall, The Structure and Development of : a Plant Cancer. By Erwin F. Smith (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 255 ; 1913).—This is a bulletin on the histology of crown gall (caused by *Bacterium tumefaciens*).

The writer has experienced considerable difficulty in differentiating the organism in stained sections. The best results have been obtained with material impregnated with chloride of gold.

Diseased tissue was found to stain deeply with potassium chromate and neutral ammonium chromate, whereas normal tissue was only feebly stained.

A general summary of previous work on this organism by the same author is given.

The bacterium is a soil organism and a wound parasite, and the author considers the relation between host and parasite to be one of symbiosis, in which the parasite has the advantage. The organism can be easily isolated from the tissues of the gall and grows readily on the ordinary culture media.

The bacteria are not abundant in the cells ; and they occur inside the cell but outside the nucleus. The author considers that the injury is mostly due to the by-products formed during the development of the organism and the reactions set up by the cells against the intruding organisms.

A large number of plates of microphotographs of diseased tissue are given.—*D. M. C.*

Cytisus × Dallimorei (*Bot. Mag.* tab. 8482).—Family *Leguminosae*, tribe *Genisteae*. A cross between *C. scoparius* var. *Andreanus* and the White Portugal Broom, *C. albus*. Shrub, 6–8 feet high. Leaves uni- or trifoliate. Flowers pale purple touched with rose; wing-petals rich crimson. Obs.—The yellow has almost entirely disappeared.—*G. H.*

Cytisus nigricans (*Bot. Mag.* tab. 8479).—Europe. Family *Leguminosae*, tribe *Genisteae*. Shrub. Leaves 3-foliolate. Racemes terminal, 6–7 inches long. Corolla yellow.—*G. H.*

Dendrobium Imthurnii (*Bot. Mag.* tab. 8452).—New Hebrides. Family *Orchideae*, tribe *Epidendreae*. Herb, epiphyte. Leaves elliptic-oblong, 3–4 inches long. Flowers medium size, white; labellum three-lobed, 1 inch long.—*G. H.*

Dendrobium Schuetzei (*Bot. Mag.* tab. 8495).—Philippines. Family *Orchidaceae*, tribe *Epidendreae*. Herb, epiphyte, 6–16 inches high. Leaves 3–4 inches long. Peduncles subterminal, few-flowered. Flowers large, 3 inches across, white lip, with green at the base.—*G. H.*

Desmodium Species suitable for keeping down Weeds and manuring the ground in Tropical Cultures. By H. Harms (*Not. König. Bot. Berlin*, vol. v. no. 50, pp. 308–318; Jan. 1913; with 1 text figure).—In tropical agriculture low-growing bushes or herbaceous plants have been planted with success between the growing crops (especially when these consist of trees) in order to keep down the weeds and to prevent the heavy rains washing the earth from the roots. In the Asiatic caoutchouc culture, for example, *Passiflora foetida*, *Crotalaria striata*, *Mimosa pudica*, *Desmodium triflorum*, &c., have been used for this purpose with advantage.

Leguminous plants are particularly to be recommended for inter-planting since, owing to the possession of root-nodules, they will enrich the soil with nitrates as well as restrict the growth of weeds.

In East Africa several low-growing species of *Desmodium* have been very successfully used between various trees which were being cultivated. *D. hirtum*, *D. barbatum*, *D. adscendens*, *D. lasiocarpum*, *D. triflorum*, *D. scalpe*, *D. polycarpum*, *D. tortuosum*, as well as some other plants, are systematically described in this contribution.—*R. B.*

Deutzia longiflora (*Bot. Mag.* tab. 8493).—Western China. Family *Saxifragaceae*, tribe *Hydrangeae*. Shrub, 3–7 feet high. Leaves lanceolate, $1\frac{1}{2}$–$3\frac{1}{2}$ inches long. Cymes forming a many-flowered pyramidal corymb, $2\frac{1}{2}$ inches across. Petals ovate, rose-coloured in bud, $\frac{1}{3}$ inch long.—*G. H.*

Dianthus, dwarf species. By W. Irving (*Gard. Chron.* April 19, 1913, p. 254, 7 figs.). A good account from a garden standpoint of 11 species.—*E. A. B.*

Drainage of Agricultural Land. By C. T. Baines (*Jour. Bd. Agr.* vol. xx. no. 1, pp. 26–30).—Method is described, and an estimate of cost is given.—*A. S.*

Elsholtzia Stauntoni (*Bot. Mag.* tab. 8460).—China. Family *Labiatae*, tribe *Satureineae*. Under-shrub, aromatic, stem 4–5 feet high. Leaves $3\frac{1}{2}$–$4\frac{1}{2}$ inches long. Verticillasters 5–10 flowered. Corolla rose-purple.—*G. H.*

Enological Studies. By William B. Alwood (*U.S.A. Dep. Agr., Bur. of Chem., Bull.* 145 ; Nov. 20, 1911).—The United States Bureau of Chemistry has to perform duties under the Food and Drugs Act which require the possession of definite data on the methods of wine making and of its by-products made in the several wine districts of the country. As a first step a detailed study was made of the chemical composition and general character of the several varieties of grapes grown in the Central and Eastern States, especially those sent to the wineries at Sandusky, Ohio. A chemical study of the commercial wines produced in the middle and eastern wine-growing districts was also found necessary for the purpose of comparing their quality with that of wines made under the direction of the Bureau itself.

The tests were confined to what are called 'American Grapes': that is, native seedlings and crosses produced in America from European species as distinguished from the distinctly European varieties grown so largely in California. A description is given of the tests as carried out in 1908, 1909, and 1910, and elaborately arranged tables are given showing the results of these tests. There is a column for each variety tested, and the results, computed in grammes per cent. of expressed juice, are given under headings for density for total solids, sugar-free solids, sugar as invert sugar, acid as tartaric, the last four headings being quoted for *Average*, *Maximum*, and *Minimum*.—*M. L. H.*

Epidendrum. By M. Ehinger (*Orchis*, vol. vii. pt. ii. pp. 26–27).—Many species of *Epidendrum* are well worth growing, on account of their delicious perfume, viz. *E. fragrans*, *odoratissimum*, *gracile*, *ionosmum*, and *odoratum*. *E. polybulbon*, *E. ochraceum*, *E. erubescens*, *E. cochleatum*, and *E. vitellinum* are delicate miniatures, remaining in flower for eight to ten weeks. Many of the varieties are found in Mexico, Guatemala, Costa Rica, and in the north of Brazil.—*S. E. W.*

Eriopsis Helenae (*Bot. Mag.* tab. 8462).—Peru. Family *Orchidaceae*, tribe *Vandeae*. Herb, epiphytic, $1\frac{1}{2}$–2 feet high. Leaves 16–22 inches long. Scapes, erect, curved upwards, 2 feet long. Flowers $1\frac{1}{4}$ inch across, the 5 petals and sepals alike, a little less than 1 inch yellow ; labellum, 3-lobed, $\frac{2}{3}$ inch long. Middle lobe white, with purple spots ; other lobes yellow.—*G. H.*

Excrescences, Abnormal, on Wood, Fruit, Foliage, and Roots. By E. Lemée (*Rev. Hort.* July 16, 1912; pp. 336–8; with 16 woodcuts showing examples).—An interesting article, dealing with their origin and nature.—*C. T. D.*

Explosive, A Safe, Rompertit C. By P. Schmidt (*Oestr. Gart. Zeit.* vol. vii. pt. ix. pp. 343–346).—Rompertit C has been used with success for removing tree stumps and also for making holes for planting trees. The ground is loosened in all directions by the explosion, facilitating the admission of air.—*S. E. W.*

Fig, Fructification of, by Blastophaga. By G. P. Rixford (*Jour. Econ. Entom.* v. p. 349; Aug. 1912).—An account of the part played by the gall gnat *Blastophaga* in fertilizing the fig. This insect has been introduced into California, and the outlook for the production of the Smyrna fig in that country is said to be very bright.—*F. J. C.*

Forcing (*Oestr. Gart. Zeit.* vol. vii. pt. ix. pp. 330–331).—Excellent results were obtained with Lilacs, *Quercus pedunculata* var. *fastigiata*, *Fraxinus excelsior*, *Carpinus Betulus*, *Corylus Avellana*, and *Magnolia Alexandrina* under the following treatment:—The shrubs are dried for three days at a temperature of 79° F., and are then placed in Knop's solution. This liquid consists of a mixture of 1 part by weight of magnesium sulphate, 1 part potassium phosphate, 1 part potassium nitrate, and 4 parts of calcium nitrate dissolved in water (quantity not given). The dormant period of plants grown in pots is curtailed if they are repeatedly watered with Knop's solution. A Japanese oak treated in this way came into leaf in January instead of March.—*S. E. W.*

Forestry in Nature Study. By Edwin R. Jackson (*U.S.A. Dep. Agr., Farm. Bull.* 468, 12 figures).—This bulletin shows how the study of trees in the forest—not study of forest trees—may be included in a Nature Study Course.

After a paragraph on "methods" of teaching and the value of the subject the author gives a scheme of work for six grades or classes. Each scheme is divided for three terms. These schemes are well worth the notice of nature students and teachers in this country. The study of trees is meant to be a part of a general scheme in Nature Study and not a complete scheme in itself.

The bulletin gives a few experiments which are simple but instructive. The suggestions for field trips, a forest calendar, and a museum are excellent.

The appendix contains a list of reading books suitable for children, reference books for teachers, and a key to the chief forest trees.

The whole work is one which must give infinite pleasure to Nature Study teachers and will surely help to make one's work interesting and successful.—*W. W.*

Fruit-keeping, Problems affecting. By E. Meeking (*Jour. Dep. Agr. Vict.* March 1913, pp. 174–178).—Problems being investigated in Canada and U.S.A.: (*a*) The effects of various methods of picking and handling fruits. (*b*) The influence of different methods of packing, both with respect to the systems under which the fruit is packed, and also the style of package used. (*c*) The results of applying cool storage at various periods after fruit is picked. (*d*) A study of the physiological and chemical changes which take place in fruits, both under cool storage transportation and under ordinary conditions. (*e*) The effects of punctures, bruises, and abrasions of the skin on the keeping qualities of fruits. (*f*) The reason why fruits vary in keeping qualities, even when subjected to similar treatment regarding cultivation, harvesting, packing, and transportation.

These investigations show the very great importance of careful handling in picking and sorting, also that the higher the temperature at which the fruit is picked the more speedily should it be placed in cool storage, and the low temperature should be retained till placed on the market.—*C. H. H.*

Furcraea elegans, (*Bot. Mag.* tab. 8461).—Mexico. Family *Amaryllidaceae*, tribe *Agaveae*. Under-shrub, stemless. Leaves 40–50, rosulate, 6½–8 feet long. Inflorescence to 25 feet high, bulbiferous. Perianth ¾ inch long, pale purple, at length brownish, lobes very pale green within. —*G. H.*

Gladioli, New, 'Iris' and 'Jean Ragot.' By S. Mottet (*Rev. Hort.* Jan. 16, 1913; pp. 35–37; coloured plate).—An interesting article on Gladioli generally. The plate depicts two very handsome forms: 'Iris,' bold flowers of a delicate mauve, slightly striped with crimson in centre; 'Jean Ragot,' bright red, with darker radiating streak on, central petal with white base.—*C. T. D.*

Hats of Vegetable Material. By Dr. Carl Curt Hosseius (*Beih. Bot. Cent.* Bd. 30, Abt. 2, Heft 1, pp. 79–87; 7 figs.).—The author describes fully the shapes and methods of making hats, and gives the species of grass, palm, &c., which are used in all the various countries in which hat-making is practised.—*G. F. S. E.*

Heliotropium anchusaefolium (*Bot. Mag.* tab. 8480).—South America. Family *Boragineae*, tribe *Heliotropieae*. Herb, perennial. Leaves linear-lanceolate. Corolla violet, corolla ¼ inch across, on long, branched scorpioid racemes.—*G. H.*

Hydrangea rosea-paniculata 'Excelsior.' By L. Foucard (*Rev. Hort.* July 16, 1912; pp. 324–6; 2 illustrations).—This is a cross between *H. hortensis rosea* and *H. p. grandiflora*, and is recommended as extremely floriferous, which the illustration confirms, and of a rich rose colour. The second illustration shows *H.* 'Professor D. Bois,' a vigorous plant with very large individual flowers, also of a deep rose, but not of like hybrid origin.—*C. T. D.*

Hydrangea Sargentiana (*Bot. Mag.* tab. 8447).—China. Family *Saxifragaceae*, tribe *Hydrangeae*. Shrub, 6–7 feet high. Leaves 6–12 inches long. Corymb, dense-flowered, 5–6½ inches across; fertile flowers, before opening, pale violet; barren flowers, 1–1½ inch across, white.—*G. H.*

Hypericum aureum (*Bot. Mag.* tab. 8498).—S.-E. United States. Family *Hypericaceae*, tribe *Hypericeae*. Under-shrub, 2–4 feet high. Leaves oblong, 1¼–3 inches long. Cymes three-flowered. Flowers 1 inch across, yellow.—*G. H.*

Hypericum Kalmianum (*Bot. Mag.* tab. 8491).—N. America. Family *Hypericaceae*. Shrub, 1–2 feet high. Leaves 2 inches long. Flowers ¾ inch across.—*G. H.*

Impatiens Herzogii. By S. Mottet (*Rev. Hort.* Jan. 1, 1913; pp. 11–12; 1 illustration and coloured plate).—The former represents a handsome plant about 2½ feet high, the latter a truss of six salmon-red flowers, individually about 2 inches in diameter. Highly recommended.—*C. T. D.*

Indian Corn Seed in West Virginia, Condition of, and How to Test it (*U.S.A. Exp. Stn., West Virg., Circ.* 5; April 1912; plate).—The spring in which this circular appeared followed after a wet October and a sharp early frost, and the writer impresses upon farmers that if they want to give themselves any chance of securing a good crop of Indian corn it is imperatively necessary to test the ears of corn that are to be used for seed. He gives directions for this testing and declares that, as it does not require more than 15 good ears of corn to plant an acre of ground, the average West Virginian farmer can test all the seed he will want in a single evening.—*M. L. H.*

Indian Corn, Native Seed. By E. G. Montgomery (*U.S.A. Exp. Stn., Nebraska, Bull.* 126; March 1912; plates).—The writer states that during the past ten years there has been a general demand for information regarding the relative values of different varieties of corn, of various types of ear, and of seed from different regions. The experience of farmers has been that seed corn, brought from one region to another, will often not give good results the first year in the new locality, though sometimes it does excellently after a few years, or when it is "adapted." It is easy to understand that in an immense country like the United States, where there is to be found almost every variety of climate and soil, the same type or strain of seed could not possibly be the one best suited to each of these sets of widely differing surroundings. This bulletin gives the results of some experiments in acclimatizing Indian corn seed procured from other parts of the Northern States at the experiment station in Nebraska.

The writer concludes that it will be safer for Western growers to try to improve strains of their native seed rather than to import even from the Eastern part of their own State.—*M. L. H.*

Indian Corn, Water Requirements of. By E. G. Montgomery and T. A. Kiesselbach (*U.S.A. Agr. Exp. Stn., Nebraska, Bull.* 128; May 8, 1912; plates).—For several years the water requirements of Indian corn have been studied at the Nebraska station. This bulletin embodies the results of the latest experiments, which are described, and tabulated analyses are given. The corn was grown under glass in special cases devised for the work, and a brass coil was used to distribute the water throughout the soil mass. The cans were kept at five different degrees of saturation. The results showed that the lowest water requirement per unit of dry weight was 45 to 60 per cent., and 60 per cent. saturation was found to be the optimum for a large yield. Hourly and daily records were kept on water loss from the plants and on evaporation from a free water surface. The records show a very close correlation. The daily water loss fluctuated several hundred per cent., but was closely correlated with changes in temperature, humidity, and wind velocity. In all cases "transpiration" appeared to be essentially "evaporation." Data have also been secured for several years on the relation of water loss to leaf area and to dry weight. Water loss is found to be more closely related to leaf area than to dry weight. The experiments included some as to the effect of added manure on the water requirements of the plants. These showed that when manure was added to soil of three degrees of fertility the water requirement was decreased, the greatest decrease occurring with the originally least fertile soil. With the originally fertile soil the decrease was small, and there is some doubt whether, under field conditions, adding manure to soils of good fertility would decrease the water requirements at all.—*M. L. H.*

Insect Attacks on Fruit Trees and Bushes, Some New and Unusual. By F. V. Theobald (*Jour. Bd. Agr.* vol. xx. No. 2, pp. 106–116).—The Apple Leaf Sawfly (*Lygaeonematus moestus*, Zaddach), which is new to Britain, is mentioned as occurring in Hampshire and Berkshire.

The occurrence of two species of aphides hitherto undescribed is recorded. One species (*Myzus fragariae*, Theobald) attacks strawberries, and the other (*Rhopalosiphum Brittenii*, Theobald) currants and gooseberries.

The Beech Orchestes (*Orchestes fagi*, Barens), which normally attacks the leaves of the Beech, is reported as having caused serious damage to apple fruits in a Devonshire garden.

The Ash and Willow Scale (*Chionaspis salicis*, Linn.) has added yet another plant to its already long list of hosts, since at Woburn and at Wye it has attacked currants.

The Garden Chafer (*Phyllopertha horticola*, Fabr.), so well known as a destructive pest, in its larval stage, of grass and roots, is reported as attacking apple fruits in its adult stage; whilst mention is made of the fact that the Board of Agriculture have records of this beetle

attacking not only apples, but in addition pears, strawberries, raspberries, and currants.

The caterpillars of the common V-Moth (*Halia wavaria*, Linn.) have occurred abundantly on currants and gooseberries at Woburn.

The Sycamore Coccus (*Pseudococcus aceris*, Sign.) is recorded from two localities as attacking apple trees, and the Pear Leaf Curling Midge (*Cecidomyia pyri*, Bouché), which, although hitherto known to attack pears, has never been complained of, is reported as having increased to such an extent in one locality near Maidstone that it has done considerable harm.—*A. S.*

Insecticide Industries in California. By C. W. Woodworth (*Jour. Econ. Entom.* v. p. 358; Aug. 1912).—A law has recently been enacted demanding the statement upon the label of the composition of all insecticides sold in California.—*F. J. C.*

Insectivorous Birds of N.S. Wales (*Agr. Gaz. N.S.W.* vol. xxiii. pp. 663–664 and 753–754; 4 col. plates).—Coloured illustrations of the Short-billed Tree Tit, Blue Jay, Babbler (*Pomatostomus*), and Brown Tree Creeper are given.—*S. E. W.*

Insectivorous Birds of N.S. Wales (*Agr. Gaz. N.S.W.* vol. xxiv. pp. 322–323; 2 coloured plates).—Coloured pictures are given of the Spotted Ground Bird (*Cinclosoma punctatum*) and the Mountain Thrush (*Oreocincla lunulata*).—*S. E. W.*

Insects, Injurious and Beneficial, in California. By E. O. Essig (*Monthly Bull. Calif. Com. Hort. II.* Nos. 1 and 2; 351 pp.; Jan. 1913; figs.).—A very full manual of economic entomology, with descriptions and treatment of insects injurious to plants.—*F. J. C.*

Iris, a hunt for, in Dalmatia. By W. R. Dykes (*Gard. Chron.* May 17, 1913. p. 321, continued p. 322 and p. 363).—Interesting account of finding wild forms in wide range of colours, including an albino of *I. pallida* near Ragusa, *I. germanica* vars. at Melkovic, *I. pumila* at Zara, and *I. illyrica* at Zeugg, but the typical *I. pallida* was not found.—*E. A. B.*

Iris caroliniana (*Bot. Mag.* tab. 8465).—Virginia and Carolina. Family *Iridaceae*, tribe *Irideae*. Herb. Leaves 3 feet long. Perianth-tube green; outer segments of the limb dependent, obovate, over 1 inch long, lavender-purple, with yellow base.—*G. H.*

Irises, New. By W. R. Dykes (*Gard. Chron.* July 12, 1913. p. 25).—Notes on hybrids, especially *tenax* × *Wilsonii*, *tenax* × *Purdyi*, *chrysographus* × *Forrestii* and *Wilsonii* × *sibirica* apparently raised by the author.—*E. A. B.*

Iris Oncocyclus 'H. Denis.' By F. Denis (*Rev. Hort* Sept. 16, 1912; p. 424; coloured plate).—This is a hybrid of the third degree,

Regeliocyclus Korparii and *Oncocyclus Susiana*, which latter it much resembles. Some interesting notes on the cultivation of the section generally.—*C. T. D.*

Land, The Use of Explosives in Clearing. By J. F. Kadonsky (*U.S.A. Exp. Stn., Wisconsin, Bull.* 216; Nov. 1911; 20 figs.).—The presence of resins in pine stumps makes their natural decay a very lengthy process, and this bulletin gives the results of investigations into the methods of removing them by the use of explosives.—*A. P.*

Lands, Peaty Swamp; Sand and Alkali Soils. By C. G. Hopkins, J. E. Readhimer and O. S. Fisher (*U.S.A. Exp. Stn., Illinois, Bull.* 157; July 1912; 7 plates).—There are immense areas of peaty swamp lands in the northern parts of Illinois, and as a rule they grow poor crops. The field experiments here detailed show the application of potash to these soils to have considerably increased their productive capacity.—*A. P.*

Leptospermum scoparium, New Varieties of. By D. Bois (*Rev. Hort.* Nov. 16, 1912; pp. 520–1; coloured plate).—This represents two very pretty varieties: one, *L. s. Nicholsii*, with an abundance of small deep-rose flowers, the other, *Boscawenii*, raised in Cornwall, with larger flowers, white, with rose-red centre. Both very attractive, of Australian origin, but only suited for mild climates, such as Cornwall, the Scillies, or the West of Ireland.—*C. T. D.*

Lilies in 1912. By A. Grove (*Gard. Chron.* Jan. 4, 1913, p. 1).—Useful notes on behaviour and cultural requirements of new and rare lilies.—*E. A. B.*

Lilium candidum (*Rev. Hort.* July 16, 1912; p. 318).—If the stem be severed low down, when the first flowers are just opening, and inserted in soil kept very moist, after a short period of flagging, the plants resume vigorous development and perfect their blooms successively for a fortnight. The foliage, however, becomes yellow and perishes.—*C. T. D.*

Lilium regale (syn. **L. myriophyllum** Hort., non Franchet.). By E. H. Wilson (*Gard. Chron.* June 21, 1913, p. 416; 2 figs.).—Account of the discovery of and a table of differences compared with, Franchet's type specimen.—*E. A. B.*

Lime and Magnesia, Effect of various Ratios of, on the Growth of Plants. By P. L. Gile (*U.S.A. Exp. Stn., Porto Rico, Ann. Rep.* 1911; pp. 18, 19).—This has been tested by growing rice in nutrient solutions of the chlorides of these elements, the various ratios of lime to magnesia from 10 : 1 to 1 : 10 being tried. The results show that while the ratio appears to exert an action at comparatively high concentrations it does not at low concentrations, at least not within the ratios tried. It appears that the question is not the simple one of a balancing of lime with magnesia, but of these two with all the

other nutrients, and the facts so far ascertained seem to point to the conclusion that the toxicity of an excess of lime or magnesia is due not simply to an unfavourable ratio between these two salts, but to an unfavourable ratio between the salt that is in excess and all the other salts present. In ordinary soils the concentration of all the salts is extremely low, and the toxic action of any one salt in such circumstances would not be expected to become apparent unless it were greatly in excess of all the others. But in alkali soils, where there is a concentrated salt solution, it appears that the ratio of lime to magnesia may be of the utmost importance in determining the growth of plants.—*A. P.*

Lime for Orchards. By P. J. Carmody (*Journ. Dep. Agr. Vict.* Dec. 1912, pp. 640–641).—On soils rich in lime the wood is matured earlier, and the fruit-buds are more stocky and robust, than is the case with trees grown on soils deficient in lime. It is generally recognised that the trees are not so manageable nor so prolific in bearing in soils where lime is deficient. Though lime plays an important part in the apple and pear tree, it is in the stone fruits that its value is most apparent. It is a familiar fact that in soils rich in lime the stone fruits set their crops well, and are not so prone to cast off their fruit at the period of "stoning" as is otherwise the case. Where trees are making extensive wood growth with abundant foliage there is but little doubt that the application of lime at the rate of 5 to 8 cwt. to the acre would be of pronounced benefit.—*C. H. H.*

Lime in Relation to Soil Fertility. By John W. Paterson and P. R. Scott (*Journ. Dep. Agr. Vict.* pp. 619–628).—Summary and conclusions: (1) Lime tends to leave the surface soil through various channels, and fresh applications become necessary to maintain fertility. (2) Carbonate of lime is the best form of lime for the soil. (3) Burnt and slaked lime are rapidly changed to carbonate when they are applied to land. (4) The rate at which lime acts depends on its fineness of division. (5) Lime, but especially hot lime, has a good effect upon the mechanical condition of stiff clays. (6) Gypsum also coagulates clay, but it has not the beneficial action of lime in other directions. (7) Lime greatly hastens the production of nitrates. (8) It has a good effect in liberating potash and phosphoric acid, especially when the latter is combined with iron or alumina. (9) Where required by soil, lime produces larger crops. (10) It produces root crops which are of greater feeding value per ton. (11) It may often be a profitable application to grass land. (12) Lime kills sorrel, dock, and other acid-loving weeds. (13) It is specially stimulating to lucerne, clovers, and leguminous plants. (14) Lime will not act if phosphates are deficient. (15) It increases the need, everywhere present, of ploughing in green manures or stubbles. (16) It facilitates this operation. (17) The surest method of determining the need of lime is to dress trial strips and await results.—*C. H. H.*

Lime-Sulphur Wash for Use against American Gooseberry Mildew. By E. S. Salmon (*Jour. Bd. Agr.* vol. xix. No. 2, pp. 99–106).—The results are given of a number of experiments conducted at Wye College during the summer of 1911 with the object of ascertaining at what strength (specific gravity) the lime-sulphur wash can be used on the foliage of the gooseberry from May to September without causing injury.—*A. S.*

Lime-Sulphur Wash for Use against American Gooseberry Mildew. By E. S. Salmon and C. W. B. Wright (*Jour. Bd. Agr.* vol. xix. No. 12, pp. 994–1004).—Experiments were carried out during 1912 on a number of fruit-farms in the Swanley district in order to supplement the information gained as the result of experiments conducted at Wye during 1911, and described in the *Jour. Bd. Agr.* vol. xix., No. 2. In all, 1015 bushes of nine different varieties of gooseberries were sprayed.

"Different varieties of gooseberries differ to a marked degree as regards the susceptibility of the foliage to injury from the wash. It is possible with some varieties, *e.g.* 'May Duke,' to spray repeatedly throughout the season with lime-sulphur, at a strength (1·01 sp. gr.) sufficient to prevent the attacks of the American Gooseberry Mildew, without causing any injury to the foliage," whereas, in the case of some other varieties, *e.g.* 'Valentine's Seedling' and 'Yellow Rough,' the susceptibility to injury is so marked that they cannot safely be sprayed with lime-sulphur at all.

It seems probable that some varieties will prove resistant to injury early in the season (May), though susceptible later.

It is concluded that "under ordinary summer weather conditions the 'strength' of the lime-sulphur wash should be as follows:—

"For 'Whinham's Industry,' 'Rifleman,' 'Warrington,' and 'May Duke,' 1·01 sp. gr.

"For 'Lancashire Lad,' 1·005 sp. gr.

"For 'Crown Bob,' 1·005 sp. gr. early in the season; later in the season some injury may be caused.

"For 'Berry's Early,' 1·005 sp. gr. early in the season, when the bushes are more or less shaded; later in the season injury is caused by the wash at this, and at lower, concentrations."—*A. S.*

Linnaea borealis. By Emil Giger (*Beih. Bot. Cent.* Bd. 30, Abt. 2, Heft 1, pp. 1–78; 11 tables, 3 figs.).—The author gives a thorough "monographic study" of this interesting plant, with a map showing the distribution. The chief points considered are as follows: Nomenclature and systematic (including Wittrock's varieties); morphology of vegetative organs; anatomy of stem, root, and leaf; development of flower; abnormal flowers; development of anthers, pollen, carpels, ovules, and embryo; pollination and fertilization (including a list of insect visitors); germination and seedling. Lists are also given of the various Conifers in Europe, Asia, and America,

and of the other plants in whose company *Linnaea* has been observed.

He notes that in Asia and America it is usually found either along with the same species or with the characteristic species for either continent of the same genus.

When forests are cut down, the *Linnaea* disappears along with other shade plants, and cannot establish itself again in competition with grasses and herbaceous woodland plants. Besides the usual habitat in coniferous woods, it has been observed in Beech forest in Schleswig-Holstein and in Birch woods in Scandinavia. It also occurs in Arctic dwarf shrub heaths (Lapland, Alaska) and in the Arctic Tundra. A list of localities is given, and also a bibliography of 240 references.

G. F. S. E.

Lissochilus Andersoni (*Bot. Mag.* tab. 8470).—Tropical West Africa. Family *Orchidaceae*, tribe *Vandeae*. Herb, terrestrial. Leaves, 2 narrow, 10–12 inches long. Flowers ¾–1 inch long, pale sulphur-yellow.—*G. H.*

Lomaria ciliata. By H. Koehler (*Gartenflora*, vol. lxii. pt. iii. pp. 66–67; 1 fig.)—*Lomaria ciliata* is a variety of *L. gibba*. It is grown in the greenhouse, close to the glass, and appreciates regular doses of weak liquid manure. It is propagated by sowing the spores.

S. E. W.

Magnolia salicifolia (*Bot. Mag.* tab. 8483).—Japan. Family *Magnoliaceae*, tribe *Magnolieae*. Tree, deciduous, 15–20 feet high. Leaves oblong-lanceolate, 3–6 inches long. Petals 6, pure white, 2–2¼ inches long.—*G. H.*

Magnolias, Deciduous, Old and New World Species. By Emile Sadeceau (*Rev. Hort.* Aug. 16, 1912, pp. 369–373; and Sept. 16, 1912, pp. 426–8, on the New World species; 4 illustrations).—A long and interesting article, treating of 15 species in all, with special reference to an article on the subject in *The Garden* (Nov. 10, 1894) by W. I. Beard.—*C. T. D.*

Maize. By A. H. E. McDonald (*Agr. Gaz. N.S.W.* vol. xxiv. pp. 326–330).—Maize makes heavy demands on the fertility of the soil. It requires moisture, humus, and the usual plant foods. The latter can be supplied by the following mixture: superphosphate 4 lb., bone dust 2 lb., dried blood 3 lb., and potassium sulphate 1 lb. Apply 1½ cwt. to the acre. The fertilizer is applied with the combined seed and fertilizer drill.—*S. E. W.*

Mango, The Oahu. By J. E. Higgins (*U.S.A. Exp. Stn., Hawaii, Ann. Rep.* 1911; pp. 35–38; 2 plates).—A seedling tree six or seven years old has produced nearly seedless fruit. The husk was present but the seed presented an undeveloped condition with often just the seed-coat present, about 75 per cent. of the crop having no viable seed.

It was a handsome fruit with a large proportion of flesh. No mango weevil was found in these mangos and the result of an attack of this pest on seedless fruits will be watched with interest as it is the seed upon which the larva feeds. The 'Oahu' is considered worthy of propagation as a basis for breeding towards complete seedlessness.—*A. P.*

Mangrove Trees: At what Period of the Year should these be Peeled to obtain Tannin-Bark? By G. Volkens (*Not. Königl. Bot. Berlin*, vol. v. No. 50, pp. 279–282; Jan. 1913).—The examination of mangrove bark from East Africa in 1910 showed that the quantity of tannin contained in the bark was about the same at whatever time of the year or the day the bark had been gathered. The colour which is imparted to the leather varies, however, with the date at which the bark is collected. The barks of *Rhizophora* and *Bruguiera* collected towards the end of the year produce a leather which is much lighter in colour and less inclined to a reddish tint than the bark gathered earlier.

Volkens finds, as a result of his inquiry, that the material which colours the leather red is absent from the bark when the trees are just expanding their leaves, and that consequently (in order to avoid the undesirable red coloration of the leather) this period is the most suitable at which to gather the bark. In East Africa the new leaves are expanded in November and December, but in other parts of the world this process takes place at other times of the year.—*R. B.*

Mendelism and Lamarckism. By A. Menuissier (*Rev. Hort.* July 16, 1912; pp. 332–4).—Interesting extracts from *Le Bulletin scientifique de la France et de la Belgique* relating to a controversy between Dr. Haagedorn, champion of Mendelism, and M. E. Rabaud on the neo-Lamarckian doctrine. The remark is finally made that while the Mendel theory has led to very practical results, the counter hypotheses have failed to do so.—*C. T. D.*

Mesembryanthemum, Leaf Tips of. By Dr. O. Oberstein (*Beih. Bot. Cent.* Bd. 29, Heft 2, pp. 298–302; with 2 plates and 3 photographs).—The author describes the anatomical details of the peculiar hairlike papillæ (emergences) found on the tips of the leaves of this genus. Similar structures occur in Bruniaceae. He considers that they protect the very young growing leaf from loss of water by evaporation, and that they are not able to absorb water in the form of mist, as has been suggested by others. Later on in life the corky mesophyll takes on this function. The bundle of papillæ is especially conspicuous when the leaf is not larger than a composite seed.

G. F. S. E.

Mesembryanthemum Pearsonii (*Bot. Mag.* tab. 8463).—S. Africa. Family *Ficoideae*, tribe *Mesembryeae*. Herb, perennial, 1½–2 inches high. Leaves 2 connate, 1¼ inch long, 1¾ inch wide, thick, flat on inner face, gibbous on outer. Flower solitary. Corolla 1¼ inch across, outer petals linear, mauve-purple; inner smaller, dull yellow, streaked with purple.—*G. H.*

Muehlenbeckia complexa (*Bot. Mag.* tab. 8449).—New Zealand. Family *Polygonaceae*, tribe *Coccolobeae*. Herb, with thin, woody, slender stems forming dense tufted masses, or climbing over shrubs, &c. Inflorescence, short spikes; perianth white, 2 lines long.—*G. H.*

Nitrification, Influence of certain Soil Constituents upon. By John W. Paterson (*Jour. Dep. Agr. Vict.* July 1912, pp. 393–400).—(1) Mild lime is an effective means of promoting nitrification, and its action begins at once. (2) It is a safe dressing both as regards quantity and time of application. (3) Caustic lime requires greater caution in its use. (4) It should not be applied too near the time of seeding. (5) It should not be applied during the growth of any crop. (6) It should be used in smaller quantities than mild lime. (7) It will probably have a similar action to mild lime eventually. (8) Magnesiun carbonate in a limestone may or may not damage crops, but it appears to favour nitrification. (9) Red and brown soils, other things being equal, favour nitrification, as they contain a slow-acting base in the form of iron rust. (10) Gypsum is a slow form in which to apply lime. (11) Superphosphate may prove a useful aid to nitrification on some soils. (12) Salt delays nitrification. (13) Sour soils are very unfavourable to nitrification. (14) Ploughing in of green or fresh stable manure may cause a temporary shortage of nitrates, particularly on damp soil. (15) The nitrifying organisms are weakened by continued drought, and where the surface soil becomes unduly parched in a dry spell nitrification will begin slowly after rain comes.—*C. H. H.*

Nymphaeas 'Mme. Paul Cazeneuve' and 'Mme. Abel Chatenay.' By G. T. Grignan (*Rev. Hort.* Feb. 16, 1913; p. 84; coloured plate).—Two very beautiful Water-lilies. The first-named double, white, suffused with rose, the second also double, of a delicate pale blue, central stamens bright yellow, with blue recurved tops. Under-surface of leaves veined pink.—*C. T. D.*

Olive Knot Disease, Method of Spreading. By W. I. Horne, W. B. Parker, and L. L. Daines (*Phytopathology*, ii. p. 101; June 1912).—Olive knot disease is caused by *Bacillus Savastanoi* (JOURNAL R.H.S. xxxiv. p. 586). The authors consider that the bacilli are distributed by rain spattering the moist exudations which proceed from the knots and which contain living bacilli. These find their way into minute cracks and set up the disease.—*F. J. C.*

Oncidium pulchellum, Hook. By E. Miethe (*Orchis*, vol. vi. pt. viii. pp. 149–151; 1 fig.).—The orchid described by Heydt in *Orchis*, pt. iv. vol. vi., is not *O. pulchellum*, as is seen from the illustration accompanying this article.—*S. E. W.*

Oranges, Sooty Mould or Fumagine on (*Agr. Gaz. N.S.W.* p. 989).—Sooty mould on oranges is caused by the fungus *Capnodium citricolum*, which attacks the leaves, branches, and fruit. Prune off and burn the diseased branches, spray with resin wash or fumigate with hydrocyanic acid for 40 minutes.—*S. E. W.*

Orchids, Garden. By R. Schlechter (*Orchis*, vol. vi. pt. vii. pp. 112–119; 2 plates).—*Coelogyne formosa* resembles *C. speciosa*, but differs in the shape of the lip and the waved crest. It is found in the forests of Sumatra, about 4000 ft. above sea level.

Lueddemannia Vyvereana, from Peru, differs from *L. Pescatorei* in the shape of the labellum.

Bulbophyllum pleiopterum comes from Madagascar. It bears a close resemblance to *B. clavatum*.

Maxillaria Fuerstenbergiana is closely related to *M. melina*. It bears beautiful snow-white flowers; the sepals are orange yellow, and the labellum is edged with red.

M. Hennisiana is probably a native of Colombia, resembling *M. ochroleuca* in habit. It bears numerous sweet-smelling, yellowish, white flowers, and is well worth cultivation.

Brassia cyrtopetala has yellowish flowers with brown spots on the sepals, petals, and labellum. It is nearly related to *B. Lanceana*.

S. E. W.

Orchid Hybrids. By A. Hefka (*Oestr. Gart. Zeit.* vol. viii. pt. i. pp. 2–6; pt. iii. pp. 66–68; 7 figs.).—Many new hybrids have been obtained in the Imperial orchid-houses at Schönbrunn; among the most striking are the hybrids of *Laeliocattleya elegans* var. *Turneri* × *Cattleya aurea*, e.g. *L.-c. schoenbrunnensis* var. 'Erzherzog Franz Ferdinand' (white throat and petals and dark purple lip). In the variety 'Kaiserin Elisabeth' the white throat and petals are shot with yellow and the lip is pale purple. Both varieties flower in autumn and bear six flowers on a stem.

Cattleya Bowringiana × *maxima floribunda* hybrid is very floriferous, beginning to bloom in late summer, bearing violet flowers.

'Herzogin von Hohenberg' is a noble variety of *Laeliocattleya* It bears white flowers with a purple lip, six on a stem, in autumn.

'Peter Rosegger' also flowers in autumn, bearing five pink blooms on a stem. It is a cross between *C. Harrisoniana* and *L. Perrinii*.

Cattleya × *Hueliana* (*Bowringiana* × *Eldorado* var. *alba*) is in flower from August to November. It resembles *Bowringiana* in growth. The flowers are violet-purple.—*S. E. W.*

Orchid Hybrids. By O. N. Witt (*Orchis*, vol. vii. pt. ii. pp. 18–21; 2 plates).—*Sophrolaelia* × *Psyche*, a hybrid of *Laelia cinnabarina* and *Sophronitis grandiflora*, is smaller than *L. cinnabarina*, which it resembles in many respects. The flowers are larger and more beautiful than those of its parents. They are scarlet in colour.

Cypripedium × *selligerum*, a hybrid of *C. barbatum* and *C. philippense*, flowers at intervals of several years. A photograph of a specimen with four flowering stems is shown in the text.—*S. E. W.*

Osbeckia stellata (*Bot. Mag.* tab. 8500).—India and China. Family *Melastomaceae*, tribe *Osbeckieae*. Shrub, 2–7 feet high. Leaves ovate-lanceolate. Flowers in few-flowered cymes. Corolla 3 inches across, 4-petalled, lilac-red.—*G. H.*

Osmanthus Delavayi (*Bot. Mag.* tab. 8459).—China. Family *Oleaceae*, tribe *Oleineae*. Shrub, 8 feet high, evergreen. Leaves ¾ inch long, coriaceous. Flowers in terminal clusters, white. Fragrant. *G. H.*

Palms, On the Growth in Thickness in. By J. C. Schoute (*Ann. Jard. Bot. Buit.* ser. ii. vol. xi. pt. 1, pp. 1–209, with 15 plates and 77 text figs.; 1912).—It is already known that many palms exhibit a long-continued growth in thickness in which the enlargement of single cells of the primary tissue takes a prominent part, but in which the formation of new tissue is insignificant. Very little, however, is known of the exact manner in which this growth in thickness takes place, or of the extent which it attains in the different cases. Moreover, some of the methods of study employed in the past are open to criticism. The present memoir was written in order to fill, to some extent, these deficiencies in our knowledge of this subject. Amongst the numerous interesting results reached by the author the following may be mentioned:

(1) In many palms there is either no secondary growth in thickness of the stem or only an early-secondary growth which is already completed when the stem emerges from its bud-sheath. In other palms a late-secondary thickening occurs; sometimes, however, this only takes place in the basal region of the stem.

(2) So far as it has been studied, all palms show a great similarity in the structure of their stem at the moment when the growth in length of the stem ceases. This is due to the fact that the parenchyma cells of cortex and central cylinder are isodiametric and of about the same size; the sclerenchymatous fibres are also all round in section.

(3) The thickening ring is active in only a few cases when growth in length of the stem ceases; for the secondary growth in thickness this ring has little or no significance.

(4) In one and the same stem the primary condition of the lower region of the stem at an early stage is in several respects different from the primary condition of the later, upper region of the stem. Results obtained from the study of the upper stem-region cannot, therefore, be directly applied (as some previous authors have done) to explain the conditions prevailing in the lower part of the stem.

(5) The secondary growth in thickness of palms is diffuse in character in comparison with the cambial growth in thickness of the Dicotyledons and Coniferae in which it is limited to a definite region.

The physiological advantages and disadvantages to the plant of the diffuse method of growth in thickness are discussed by Schoute. The rich branching of the stem which is found in Dicotyledons and Conifers cannot take place in these stems with diffuse growth but they are able to attain great height whilst they remain comparatively slender. The heavy "heart-wood" of the Dicotyledons is replaced in the Palms by a light, spongy tissue.—*R. B.*

Pansies and Violas, The Cultivation of, by Allotment Holders, (*Jour. Bd. Agr.* vol. xix. No. 9, pp. 749–750).—The way in which cottagers and allotment holders in the neighbourhood of Hounslow (Middlesex) supplement their income by growing Pansies and Violas for what might be called the suburban gardener's trade is described. The ground is cropped during the summer months with potatos, beans, peas, &c. When these are removed Pansies and Violas are planted for sale the following spring.—*A. S.*

Papaya Investigations. By J. E. Higgins (*U.S.A. Exp. Stn., Hawaii, Ann. Rep.* 1911; pp. 26–32; 3 plates).—The Papaya cannot be propagated by cuttings, buds, scions, &c., and the aim of these investigations is to work out methods for the breeding of varieties of desired qualities that can be depended upon to reproduce themselves with reasonable accuracy from seeds, work which is much complicated by the fact that there are dicœcious and moncœcious forms, with many apparently intermediate ones. With a view to testing the possibilities of close and cross pollination experiments have been made with sixteen different combinations of pollen and stigma, and the conclusions are arrived at that pollination is not always necessary for the production of fruit, and that in the case of a certain tree producing seedless fruit this latter condition was probably not due to a lack of pollination.

A. P.

Peach Aphis. By E. E. Pescott (*Jour. Dep. Agr. Vict.* Aug. 1912, p. 513).—Spray with strong nicotine solution made by soaking tobacco stems in cold water for some days, adding a teaspoonful of caustic soda to a cask of steeping stems.—*C. H. H.*

Peach, Diseases and Pests. By W. J. Allen (*Agr. Gaz. N.S.W.* vol. xxiii. pp. 346–357; 2 plates, 1 col.).—The Peach aphis (*Aphis persicae niger*) is dark brown or black when adult; it spends the winter on the roots of the trees, and should be treated with tobacco. When the aphis appears on the branches in spring, spray with tobacco wash, hot resin and soda wash, or Sunlight soap wash. The latter is prepared by dissolving a cake of Sunlight soap in 2 gallons of water. Use warm. It does not injure the blossom. McDougall's Insecticide is also excellent.

To destroy Mediterranean fruit fly (*Ceratitis capitata*) hang tins containing kerosene in the trees and burn fallen and infected fruit.

Rutherglen bug (*Nysius vinitor*) is a small active creature about 1½ lines in length. Spray with tobacco wash or weak kerosene emulsion in the early morning and shake the branches over a sheet.

Brown olive scale (*Lecanium oleae*) is destroyed by red oil emulsion.

San José scale (*Aspidiotus perniciosus*) is very destructive; it causes a bright red stain on the fruit. Lime-sulphur or red oil emulsion is applied when the trees are dormant, or just before the buds begin to swell. Red oil emulsion is prepared by boiling 2 lb. of soft soap in 1 gallon of soft water, then add 2 gallons of red oil, stir well

till emulsified, and dilute to 60 gallons, with warm water. Apply as late as possible before the buds start.

The chaff scale (*Diaspis amygdali*) is not unlike rose scale. It is killed by spraying with resin wash, red oil, or lime-sulphur.

Kainit should be dug in above the roots of peaches infested with white ants (*Coptotermes lacteus*).

The yellow peach moth (*Conogethes punctiferalis*) lays her eggs on the half-grown fruit; the grub gnaws its way to the centre. The moth is yellow, with black spots.

Cicada angularis and *Cyclochila australasiae* produce longitudinal slits on the upper branches. The injured parts should be cut out.

The rice weevil (*Calandra oryzae*) causes the unripe fruit to drop off.

Brown rot (*Monilia fructigena*) attacks the fruit, causing it to shrivel, and also the twigs. The diseased twigs and fruit must be removed and burned, and the trees sprayed with dilute lime-sulphur. This is also a remedy for mildew (*Podosphaera oxycantha*), rust (*Puccinia pruni*), and peach curl (*Exoascus deformans*). The last disease is difficult to deal with; remove and burn all curled leaves.

S. E. W.

Peaches, Stop-back of. By E. A. Back and W. J. Price (*Jour. Econ. Entom.* v. p. 329; Aug. 1912).—Stop-back is a term used to describe the condition of peaches in which the terminal bud is killed and the lateral thus forced into premature growth. Various causes have been suggested, but the authors show that the common bug *Lygus pratensis*, well known in Britain as a pest of a variety of plants, is the real source of the trouble. No preventive measures have been tried but lime-sulphur, and a method of pruning which was advocated had no value in ameliorating the trouble, which is usually noticed only after the damage is far advanced.—*F. J. C.*

Peanut Butter. By W. R. Beattie (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ.* 98; Oct 14, 1912; plates).—The growing popularity of peanut butter as a food has led to many inquiries concerning the method of its manufacture. It is in reality a very simple preparation, consisting merely of freshly roasted peanuts ground finely and salted to taste. It was first manufactured and offered for sale as a food for invalids. It was later adopted by the strictest sect of vegetarians as a substitute for dairy butter, and has now become a generally recognized article of food among all classes in the United States. Large and well-equipped factories are being used for the manufacture of the butter, but a clean and wholesome product can also be made on a small scale provided good materials are employed and the work is conducted in a sanitary manner. Absolute cleanliness appears to be essential, so much so that peanut butter making cannot be successfully carried on in the same establishment as the earlier cleansing of the nuts, which produces an amount of dust that would be fatal to the butter.

This paper treats of the different strains of peanut, of the equipment of the factory, of roasting, blanching, grinding, blending, bottling, and packing.—*M. L. H.*

Pear Culture in the Prairie Northwest. By C. G. Patten (*U.S.A. Hort. Soc., Iowa, Ann. Rep.* 1912; pp. 160–164; 1 photo).—It is stated that not one variety of the old lists, whether they originated in England, France, Belgium, or the United States, can long endure the coldest winters or hottest summers in the northwest. The writer claims to have obtained a strain or race of hardy pears by natural crosses or inbreeding of the 'Longworth,' 'Seckle,' and 'Chinese Sond'; also by crosses of 'Keiffer' and 'Winter Nélis,' 'Russian No. 15,' and 'Anjou,' and others; and he expects that this new race will provide stocks on which such pears as 'Winter Nélis,' 'Flemish Beauty,' 'Seckle,' &c., can be grown with fair success in a climate where the winter temperature falls 30° to 40° below zero.—*A. P.*

Peat and Muck Soils. By J. A. Bonsteel (*U.S.A. Dep. Agr., Bur. of Soils, Circ.* 65; Aug. 20, 1912).—It is computed that there is still an area of probably 15,000,000 acres in the Eastern United States of unreclaimed deposits of what is called muck and peat. Both these types of soil are formed in the same way, by the disintegration of vegetable matter in swampy low-lying positions in comparatively cool climates. The writer confesses that it is difficult to draw a distinct line of difference between muck and peat, which may even occur with intermediate grad tions in the same deposit, but in general peat may be said to consist of brown or black fibrous or cellular remains of organic matter formed chiefly in bogs or ponds, while in muck the organic remains have reached a more advanced state of disintegration, and the accessory mineral matter is more apparent.

The surface features of both peat and muck deposits are almost universally those of a level plain, though when they become partially drained through natural or artificial causes irregularities in shrinkage may give rise to slight differences in elevation. They are always found in depressed areas where the natural drainage is deficient, and thus are always swampy. This fact causes the first difficulty met with in attempting to reclaim these soils. It is only after the installation of drainage systems that either class of material may be brought under cultivation. Even then there is considerable variation in the agricultural adaptability and cropping value of different areas even of the same deposit. It has been the usual experience that areas of muck are more easily reclaimed than areas of peat. This arises from the fact that the more advanced stage of decomposition of the muck, coupled with the universal presence of an appreciable amount of mineral matter, renders it more compact and better fitted to hold the growing crop in an upright position and to furnish a regular and adequate supply of moisture throughout the growing season. The fibrous peat is too loose and too light to maintain any high-growing crop in position; thus Indian corn and even the small grains are liable

to fall down and become lodged. Moreover, the peat is sufficiently fibrous to absorb large amounts of water, which it holds tenaciously within its own cellular structure at the expense of the young crop. It has been found that the nature of the subsoil has much to do in determining the agricultural value of muck deposits, those that occur in limestone regions or which overlie deposits of calcareous marl being the ones most successfully used for the production of general farm crops and for the majority of special crops.

Both peat and muck are primarily adapted to the production of special rather than general farm crops. They are specially favourable for cabbage, celery, lettuce, turnips, table beets, and peppermint. When the conditions are favourable in the way of possibilities of drainage at some times and there is an abundant supply of available water for flooding the beds at others, perhaps the most profitable crop grown upon muck and peat is the Cranberry, but all these special crops necessitate a near and constant market. The best farm crops for land of this nature are Indian corn, oats, buckwheat, and potatos, but the dark colour of the material and its evident high content of organic matter must not be taken as indications of extraordinary fertility. In practice it has been found necessary to make considerable applications of mineral fertilizers and even of stable manures to such soils before they could be brought to a highly profitable condition of cultivation. It may be that the bacterial condition of these freshly-drained organic soils is not favourable to the growth of certain crops, and that this deficiency is supplied through applications of stable manure. For the production of cabbage, onions, beets, and turnips upon peat and muck it is usually advisable to apply considerable quantities of lime. This may be added in the form of caustic lime, slaked and spread at the rate of about 1 ton to the acre, or by applying 2 to 3 tons to the acre of ground limestone. Where available in any quantity, wood ashes have been found of value for the growing of Indian corn and oats upon muck soils.—*M. L. H.*

Pecans. By W. N. Hutt (*U.S.A. Exp. Stn., N. Carolina*, vol. xxxii. No. 9; Sept. 1911; plates).—A second report on Pecan-growing in the State of North Carolina. The writer states that he did not intend this communication to follow so hard after the former, but events are moving fast in his State in the matter of Pecan-growing. The nut is growing enormously in popularity and the planting of commercial orchards is proceeding apace. At the same time there has been experimental growing at State Test Stations, which have exploded several cherished theories on the subject of the Pecan tree and established some new facts which are of great interest to growers. This bulletin deals with the subjects of varieties, cultivation, propagation, soils, and fertilizers.—*M. L. H.*

Pecan, The. By C. A. Reed (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 251; July 1912; plates).—An account of the Pecan tree (*Hicoria Pecan*), a nut which grows in the United States, both wild and planted

on farms. It is just now attracting great attention and being widely exploited there. Orchards are being rapidly planted, in many cases to be passed on afterwards to hopeful investors, and nurserymen cannot keep up with the demand for young stock.

The writer thinks that more caution might well be exercised in the matter. Many of the favourable calculations on which planters are relying are based on figures taken from single trees grown in exceptional circumstances, and would certainly not represent the results from average trees grown in numbers and in average conditions. It has been said also that the Pecan is subject to no diseases and no pests, whereas such immunity is probably due to the fact that it has hitherto been planted chiefly as single specimens or has been found in its native forest. No agricultural product is without its natural enemies and other obstacles that must be overcome. The Pecan is no exception to this rule, and there are already both insect pests and fungous diseases which are known to attack it.

The writer gives maps showing the natural distribution of the wild Pecan, describes its habit of growth, its cultural distribution; discusses its economic importance, and gives an account of methods of culture and propagation. The bulletin ends with a descriptive list of the best and best-known varieties which have arisen through selection and propagation by growers and nurserymen.—*M. L. H.*

Pelargonium Cultivation for Essential Oil. By Joseph Knight (*Jour. Dep. Agr. Vict.* Nov. 1912, pp. 677–680).—Plants cut when coming into bloom, mature foliage boiled slowly in still; the oil distils out. Five to six tons of leaves are produced from the acre, yielding about 3 lb. of oil from a ton of leaves. There may be a second or third cutting of leaves.—*C. H. H.*

Persimmons, Experiments on Processes of Rendering them Non-astringent. By H. C. Gore (*U.S.A. Dep. Agr., Bur. Chem., Bull.* 141; Sept. 29, 1911; plates).—The Oriental Persimmon was introduced into America from Japan about fifty years ago, but has never become as popular there as it deserves. When it was imported the process by which the Japanese remove the excessive astringency of the fruit without destroying its firmness was not imported with it. This bulletin tells of experiments, first in preparing the fruit in the time-honoured Japanese fashion—that is, of heading it up in an empty saké cask, the saké being of the best quality. This removes all astringency within a short time and leaves the fruit firm and sound, so that it may be pared and eaten like an apple. Later experiments were tried with the view of finding some chemical substance to take the place of the saké, and it has been found that carbon dioxide will answer the purpose, a little dry starch being placed in the receptacle during the operation to prevent the fruit cracking.

How soon this use of carbon dioxide treatment becomes general will depend more on the growers than on the dealers. In the writer's opinion they should see that it is perfected and advertised, until the

public realizes that it is no longer necessary to keep persimmons until they are pulpy and over-ripe before they are fit to eat; for until the persimmon can be pared and eaten without a spoon, it will never take the place in public estimation that it deserves. *M. L. H.*

Pests, destructive, insect and fungus, scheduled by the Board of Agriculture. By H. C. Long (*Gard. Chron.* Sept. 28, 1912, p. 241).—The 17 pests scheduled are dealt with in separate articles as follows :—

1912. Oct. 1.—Narcissus Fly. *Merodon equestris.*
Nov. 2.—Wart Disease of Potato.
Dec. 7.—American Gooseberry Mildew.
1913. Feb. 1.—San José Scale.
March 1.—Brown Tail Moth.
March 15.—Vine louse.
April 26.—Gipsy Moth.
May 3.—Potato Moth.
May 24.—Black Knot.
June 7.—Nun Moth.
Aug. 16.—Mediterranean Fruit Fly.
Sept. 6.—Cucumber Canker.
Sept. 13.—Large Larch Saw-fly.
Oct. 4.—The Colorado Beetle.

and are to be continued.—*E. A. B.*

Phrynium Lubbersii. By A. Heydt (*Gartenflora*, vol. lxi. pt. xviii. pp. 405–406).—*Phrynium Lubbersii* is a decorative house plant, of easy culture. It resembles *P. setosum*, but the leaves are pale yellow, with pale green markings.—*S. E. W.*

Platyclinis latifolia. By A. Heydt (*Orchis*, vol. vi. pt. vi. pp. 102–103).—Well grown in shallow pans, is very decorative, as the panicles are covered with sweet-smelling flowers.—*S. E. W.*

Piuns flexilis (*Bot. Mag.* tab. 8467).—W. North America. Family *Coniferae*, tribe *Abietineae*. Three, 40–80 feet high. Leaves in bundles of five. Cones ovoid, 3–4 inches long.—*G. H.*

Podocarpus, A New. By R. Pilger (*Not. Kōnig. Bot. Berlin*, vol. v. No. 50, p. 299; Jan. 1913).—Describes the characters of a new species of *Podocarpus*, for which the name *P. Roraimae* Pilger is proposed. It was discovered on Roraima at a height of about 1900 metres above sea. It is related to both *P. macrostachyus* and *P. oleifolius*, although easily distinguished from them.—*R. B.*

Poga oleosa Pierre. **An Oil-yielding Tree from Cameroon and Gaboon.** By A. Engler (*Not. Kōnig. Bot. Berlin*, vol. v. No. 50, pp. 294–298; Jan. 1913; 3 figs. in the text).—*Poga oleosa*, one of the Rhizophoraceae, was first discovered by the missionary P. Klaine at Libreville in West Africa. The tree reaches a height of 25–50

metres, and the smooth stem has a diameter of 2 metres. The fruit is a spherical stone-fruit, with a thin, fleshy exocarp, and a very thick, woody endocarp. One or two loculi of the quadrilocular fruit are usually sterile. The acotyledonous embryos are very rich in oil. The paper contains excellent figures of the chief characters of this tree, and illustrates the anatomy of the leaf—*R. B.*

Poinsettias, New: P. pulcherrima alba and P. × salmonea Adneti. By R. Adnet (*Rev. Hort.* May 16, 1913; pp. 227–8; coloured plate).—The plate represents two very attractive forms. *P. p. alba* is hardly correctly named, as the bracts are yellowish, suffused with light pink; those of the other are of a delicate rose-pink throughout.—*C. T. D.*

Poisonous Plants. By J. H. Maiden (*Agr. Gaz. N.S.W.* vol. xxiii. p. 604).—*Olearia viscidula* and *Vanilla* must be added to the list of plants which may irritate the skin.—*S. E. W.*

Pollenizers for Fruit (*Jour. Dep. Agr. Vict.* July 1912).—E. E. Pescott writes, p. 453, that 'Sturmer Pippin' is found to be one of the best pollenizers for 'Jonathan' apple, and E. Wallis writes (p. 505) that 'Keiffer' pear is successfully pollenized by 'Harrington's Victoria,' 'Howell,' and 'Le Conte,' also that 'Bailey's Bergamot' is well pollenized by 'Williams' Bon Chrétien'; spur pruning makes 'Winter Nélis' bear. 'Early Guigne' cherry is a very light cropper if isolated, but crops well with 'Black Bigarreau' and 'Early Lyons.' 'Coe's Golden Drop' plum is prone to barrenness; no definite results have so far been obtained by crossing, but 'Pond's Seedling' is thought to be likely to prove beneficial as a cross.—*C. H. H.*

Pomologists, Lives of Great. By E. A. Bunyard (*Gard. Chron.* June 14, July 26, Aug. 30, 1913, with portraits). These articles deal with J. B. van Mons, A. N. Duchesne, and O. de Serres.—*E. A. B.*

Potato Clubs, Boys'. By J. C. Hogenson, M.S.A. (*U.S.A. Exp. Stn., Utah, Circ.* 5; Feb. 1912).—Potato Clubs appear to be similar to Corn Clubs mentioned in a previous journal. The first part gives full details respecting choice of seed and cultivation. The second part gives particulars of the constitution of the Club, a copy of the membership card and the rules relating to entrants for the competition. A good feature is the scoring card (see p. 13) and an explanation of the same.

The circular will prove of interest to persons having allotment gardens or school gardens.

There is much valuable information in small compass.—*W. W.*

Potato Disease, Minimizing Loss caused by (*Jour. Bd. Agr.* vol. xix. No. 6, pp. 441–443).—An article dealing mainly with the precautions which should be taken to minimize the loss from disease when storing potatos in clamps.—*A. S.*

Potato Growing in Ohio. By F. H. Ballon (*U.S.A. Exp. Stn. Ohio, Bull.* 218; June 1910; plates).—Potato culture in Ohio is rapidly developing into a vast industry. This bulletin discusses various questions which confront the grower, gives hints on planting and culture, and on spraying, and adds a classified list of varieties. The writer insists that much of the confusion into which growers fall among the hundreds of varieties offered by seedsmen, and many of the complaints made that old varieties are re-named and sent out as new, arise from the fact that there are several distinct types or families of potatos. The hundreds of varieties of different origin may be classified in these several groups. There are many varieties of separate and distinct origin which follow a single type so closely as not to be readily distinguished from each other either by habit of growth or character of tuber, even by an expert potato specialist. The classification suggested by the writer reduces the groups to the least possible number, and is based principally upon similarity of tuber rather than upon similarity of plant. The groups he gives are:—The *Triumph* Group, *Early Market* Group, *Early Ohio* Group, *Early Rose* Group, *Green Mountain* Group, *Seneca Beauty* Group, *Rural New Yorker* Group, and he mentions a few varieties belonging to each.

Spraying for fungus diseases and insect pests is strongly advised, and directions are given for making Bordeaux mixture for this purpose.

When Bordeaux mixture is needed for different sprayings during the season, much time and inconvenience may be saved by making up a "stock solution" of copper sulphate, which solution will keep indefinitely without deterioration.

Use a good barrel; remove one of the heads and fill to within 6 or 8 inches of the top with water, measuring the water by gallons. Weigh out in a sack as many pounds of copper sulphate as the number of gallons of water in the barrel. Tie the sack with strong twine close down to the contents, leaving a loop through which a stick may be thrust. Suspend the sack in the water by resting the stick across the top of the barrel in such a way that the bag will be but partially submerged. When the contents of the sack are dissolved each gallon of water will contain one pound of copper sulphate. It is well slightly to stir the solution before measuring out a portion for use. When the Bordeaux mixture is to be used proceed thus:—

Pour four gallons of the stock solution into the spray barrel and add water until the barrel is half filled; this weakening is necessary before adding the lime, or a curdled mixture will result. Weigh out in a bucket 5 lb. of fresh hydrated lime (known as "builder's lime," "flour lime," "sack lime," &c.). Add water to it, stirring vigorously and pouring off the "milk of lime" or thin whitewash into a second vessel until all the lime is dissolved. Strain, dilute still further through a fine-meshed brass wire strainer into the dilute copper solution, churning vigorously as the lime is being added. A

clear bright blue mixture should result. Add to this mixture whatever poison it may be desired to use for the destruction of insects, and finish by filling the barrel with water.

Insecticides :—

1. *Arseniate of lead* used at the rate of 3 lb. per 50 gallons of spraying mixture.

2. *Arseniate of soda.*

Commercial white arsenic	2 lb.
Carbonate of soda	4 lb.

Boil in 1 gallon of water until a clear liquid is formed. Dilute this solution to 2 gallons. Use 1 quart of this to 50 gallons of spray mixture. If not used in Bordeaux mixture, add 5 lb. of lime to ensure against burning of foliage.

3. *Paris Green.*—This, used in Bordeaux mixture, will not injure foliage. Use 8 oz. Paris green to 50 gallons water.—*M. L. H.*

Prickly Pear, Destruction of. By G. P. Darnell-Smith (*Agr. Gaz. N.S.W.* vol. xxiv. pt. ii. p. 152).—Spraying with a 12 per cent. solution of copper sulphate, or inserting a crystal of this substance in the plant, destroys Prickly Pear.—*S. E. W.*

Prickly Pears. By J. H. Maiden (*Agr. Gaz. N.S.W.* vol. xxiv. pt. i. pp. 49–55 ; 1 coloured plate, 2 plates).—*Opuntia Ficus indica*, or Indian Fig, is a nearly spineless form, but the fruit is armed with spinules, which can be removed by immersion in hot water. It is not likely to be a pest, as cattle readily feed on it. Burbank's spineless Prickly Pear does not appear to differ from the plants grown in the Sydney Botanic Gardens.—*S. E. W.*

Primula Juliae (*Bot. Mag.* tab. 8468).—Transcaucasia. Family *Primulaceae*, tribe *Primuleae*. Herb, perennial. Leaves with blades, 1 inch long and broad. Corolla purple.—*G. H.*

Primula Wattii (*Bot. Mag.* tab. 8456).—Himalaya. Family *Primulaceae*, tribe *Primuleae*. Herb. Leaves 1 inch long. Scape 4 inches high. Corolla violet, with a white eye.—*G. H.*

Proteaceae. By A. Sandhofer (*Oestr. Gart. Zeit.* vol. viii. pt. ii. pp. 82–87 ; 1 fig.)—The Proteaceae are propagated by cuttings, budding, or from imported seed. The plants require good drainage and thrive in a compost of peat, loam, sand, and a little charcoal. The following are very decorative ; *Banksia aemula*, yellowish-green flowers in March ; *B. Cunninghami*, flowers in winter ; *B. dryandroides* ; *B. ericaefolia* bears long spikes of flowers ; *B. grandis* ; *B. integrifolia* can be raised from cuttings and is useful as scion for budding ; *B. Solandri* is one of the best ; *B. speciosa* is well known ; *B. spinulosa* flowers from January to May.

Grevillea robusta, *G. Hilliana*, *G. longifolia*, *G. flexuosa* (easily raised from seed), *G. Preissei* or *Thelemanniana*, *Hakea acicularis* (bears white flowers in May), *H. elliptica* (has white flowers in July), *H. suaveolens*, *H. Victoria*, *Agnostus sinuatus*, *Protea*, *Rhopala corcovadensis* (*Roupala Pohlii*) are all worthy of cultivation. The last mentioned requires a warmer position than the others.—*S. E. W.*

Prunes. By W. J. Allen (*Agr. Gaz. N.S.W.* vol. xxiv. pt. iii. pp. 245–255; 8 figs.).—Prunes thrive in a well-drained loamy soil with plenty of lime and potash. They like moisture and sunshine. The surface soil must be kept loose and friable, and free from weeds. The following varieties are recommended: 'Prune d'Agen,' 'Robe de Sergeant,' 'Silver Prune,' 'German Prune,' 'Splendour,' 'Sugar,' 'Fellenburg,' and 'Golden Prune.' Prunes are attacked by San José scale, borers, fruit fly, red mite, aphis, and curculio. The last pest is destroyed by spraying with arseniate of lead just as the buds are opening and again when the petals are falling. Brown fruit rot and shot-hole are treated with Bordeaux mixture or lime and sulphur.—*S. E. W.*

Prunus pennsylvanica (*Bot. Mag.* tab. 8486).—North America. Family *Rosaceae*, tribe *Pruneae*. Tree, 30–40 feet high. Leaves 3–4 inches long. Flowers white, ½ inch across.—*G. H.*

Prunus salicina Lindl. By E. Koehne (*Not. König. Bot. Berlin*, vol. v. No. 50, pp. 287–288; Jan. 1913).—The paper contains a discussion of the nomenclature of this species. The author finds *P. salicina* to be identical with *P. triflora*, but that the former name has priority.—*R. B.*

Pyracantha crenulata and its variety, P. c. yunnanensis. By S. Mottet (*Rev. Hort.* May 1, 1913; 1 illustration and coloured plate).—Two new Pyracanthas highly recommended, *yunnanensis* bearing a heavy crop of deep orange-red berries, and of more robust habit.—*C. T. D.*

Puya chilensis. By R. I. Lynch (*Gard. Chron.* July 5, 1913, p. 2; 3 figs.).—Flowering of *Puya chilensis* in open air at Cambridge.

E. A. B.

Pycnostachys Dawei (*Bot. Mag.* tab. 8450).—Uganda. Family *Labiatae*, tribe *Ocimoideae*. Herb, stems 4–6 feet high. Leaves narrow-lanceolate. Spikes 1–5 inches long. Corolla, deep blue, 3–4 inches long.—*G. H.*

Pyrus ioensis (*Bot. Mag.* tab. 8488).—Central United States. Family *Rosaceae*, tribe *Pomeae*. Tree, 20–30 feet high. Leaves 3–5 inches long. Flowers violet-scented, 2 inches across, in 4–7-flowered corymbs. Fruit fragrant, yellowish-brown, globose.—*G. H.*

Quack-grass, The Eradication of. By J. S. Cates (*U.S.A. Dep. Agr., Farm. Bull.* 464 ; Aug. 1911 ; 6 figs.).—*Agropyron repens* (twitch or couch grass) is prevalent in the North Central and North-Eastern States, and a number of closely allied species in the Rocky Mountains and the Pacific States. It is believed that the principles laid down in this bulletin apply equally well to all rootstock-producing species of the same genus.—*A. P.*

Radamaea (Bentham) **and Nesogenes** (A. de Candolle), **On the Genera.** By W. Botting Hemsley, F.R.S., F.L.S., V.M.H. (*Jour. Linn. Soc.* vol. xli. No. 282, pp. 311–316; July 1913; with 1 plate).—This paper gives an historical account of the discovery of several species of *Nesogenes* and a systematic description of their principal morphological features.

Radamaea prostrata (Bentham) is shown to be more correctly referred to the genus *Nesogenes.*

The genus *Nesogenes* is restricted to coral islands, or coral formation, in two very distant, relatively small areas within the southern tropic ; the one in the Pacific Ocean with a median longitude of about 145° W. ; the other in the Indian Ocean with a median longitude of about 60° E. It is not unlikely that intermediate stations may be discovered, but it is also possible that the present widely separated stations may have resulted from the disappearance of these plants from the intervening country owing to changes in the physical conditions of these parts.—*R. B.*

Raspberry and Loganberry, Diseases of (*Jour. Bd. Agr.* vol. xix. No. 2, pp. 124–126 ; plate).—The diseases caused by the two fungi *Hendersonia rubi*, Westendorp, and *Ascochyta pallor*, Berk., are described, and preventive measures are suggested.—*A. S.*

Remusatia, The Araceae-genus, in Cameroon. By A. Engler (*Not. Königl. Bot. Berlin*, vol. v. No. 50, pp. 300–301 ; Jan. 1913).—That genera and species of plants closely related to Indian ones have been found in tropical Africa, and especially in the mountainous regions in the east and central areas north of the Equator, is well known. Now, however, an Indian plant-type has been found in the wooded district of West Africa. This is *Remusatia*, found by C. Ledermann in 1909 in north-west Cameroon, growing as an epiphyte upon the fallen trunk of a forest giant. The nearest station to this from which *Remusatia vivipara* has been recorded is in the Himalayas west of Nepal. Although the hooks upon the adventitious buds of this plant enable these structures to cling to passing animals which can convey them over long distances, yet the distance between Cameroon and Himalaya is so great that we may assume that intermediate stations for this plant will yet be discovered.—*R. B.*

Rhizoctonia Diseases (*Jour. Bd. Agr.* vol. xx. No. 5, pp. 416–419 ; plate).—The diseases caused by *Rhizoctonia violacea*, Tul., and *R. solani*, Kühn, are described, and preventive and remedial measures are given.—*A. S.*

Rhododendron Augustinii (*Bot. Mag.* tab. 8497).—China. Family *Ericaceae*, tribe *Rhodoreae*. Shrub, 3½–5 feet high. Leaves lanceolate, 1½–2½ inches long. Corolla campanulate, lobes 2½ inches across, pale rose above, white with yellow spots at the base of the tube.—*G. H.*

Rhododendron sublanceolatum (*Bot. Mag.* tab. 8478).—Japan. Family *Ericaceae*, tribe *Rhodoreae*. Shrub. Leaves narrow-elliptic or lanceolate, 1–2¾ inches long. Flowers terminal; corolla 2 inches long, crimson-scarlet.—*G. H.*

Rhododendron Wightii (*Bot. Mag.* tab. 8492).—Sikkim Himalaya. Family *Ericaceae*, tribe *Rhodoreae*. Shrub or small tree, Leaves 3¼–8 inches long. Inflorescence many-flowered. Corolla campanulate, 1¾ inch long, straw-yellow, dotted with deep red.—*G. H.*

Rice, A Sclerotial Disease of. By F. J. F. Shaw (*Mem. Dep. Agr. India, Bot. Ser.* vi. p. 11–23; July 1913; plates).—The fungus *Sclerotium Oryzae* Catt. has already been found a troublesome parasite in Italy and Japan, and has now been recognized in India. The diseased shoots turn yellow and die, but tillering occurs, and this is probably the most marked symptom of the trouble. The small black sclerotia occur in the interior of the stem, while the hyphæ penetrate the walls of the cells and destroy the protoplasm. Cultures were made, but the ascigerous stage of the fungus was not obtained.—*F. J. C.*

Root Curvature and Unsymmetrical Growth in Thickness. By A. Ursprung (*Beih. Bot. Cent.* Bd. 29, Abt. 1, Heft 1, pp. 159–218; with 1 fig.).—The author found that, of 153 curvatures in roots of *Picea excelsa*, the resulting growth in thickness occurred in 148 cases on the concave side; in 155 out of 156 cases in roots of Beech, the growth in thickness was also on the concave side.

He discusses the connexion between such eccentric growth and the conditions of tension and pressure without arriving at definite conclusions. The increase in growth seems usually (but not always) to be assisted on the side subjected to pressure and hindered on that exposed to tension. The whole subject of the effect of mechanical stress and tension on growth is fully discussed, but reference must be made to the original for details and literature.

The author points out that, in the most different cases of eccentric growth in thickness, the cross-section becomes elliptic with the major axis in the plane of curvature, with the result that the power of resistance to bending is increased.—*G. F. S. E.*

Root Nodules, Royal Palm. By G. L. Fawcett (*U.S.A. Exp. Stn. Porto Rico, Ann. Rep.*, 1911; pp. 38–39).—In the root nodules of the royal palm of Porto Rico is found a fungus which resembles in some respects that described from the nodules of *Podocarpus chinensis*, which has been grown for several years with no other nitrogen than that derived from the air. Royal palms grown from disinfected seed

in sterilized soil developed nodules which contained no fungus, and these nodules contained no stored-up starchy or nitrogenous food material as i the case with those in which the fungus is present. Tests for proteolytic enzymes in the nodules have not yet been made. Since nodules are formed without the fungus, the real problem in growing in nitrogen-free cultures is to test the comparative ability of plants with fungus-bearing nodules and those with nodules lacking the fungus to thrive under such conditions. It is thought that the nodules are possibly air roots which possess the additional function of assisting the palm to secure a larger supply of nitrogenous food material.—*A. P.*

Rosa omeiensis (*Bot. Mag.* tab. 8471).—Western China. Family *Rosaceae*, tribe *Roseae*. Shrub, 3–10 feet high. Leaves $1\frac{1}{4}$–$2\frac{1}{2}$ inches long, 9–13 foliolate. Flowers white, with usually 4 petals. Fruit ellipsoid, bright red.—*G. H.*

Rosa sertata (*Bot. Mag.* tab. 8473).—China. Family *Rosaceae*, tribe *Roseae*. Shrub, 3–7 feet high. Leaves $1\frac{3}{4}$–4 inches long. Flowers rose or rose-purple, 2–$2\frac{1}{4}$ inches across.—*G. H.*

Rose Distillation for Scent. By Joseph Knight (*Jour. Dep. Agr. Vict.* Aug. 1912).—In the South of France some scent distilleries can handle 150 tons of roses a day. The petals are stripped from the calyx, boiled in a still for about two hours, within twenty-four hours of gathering; the distillate is Rose water. For perfume extraction rose petals are boiled in olive oil; after twenty-four hours the petals are drawn out and pressed; the same process is repeated with fresh petals until the oil is sufficiently impregnated with the scent of the flower, when it is stored, and the essence extracted by some highly rectified solvent. This enfleurage and maceration system is very popular in France, and a very considerable amount of pomade is made and used in this form.—*C. H. H.*

Rose 'Madame Edouard Herriot.' By G. T. Grignan (*Rev. Hort.* Nov. 1, 1912, p. 496; coloured plate).—This represents a very beautiful Rose of a deep rich salmon colour, finely double, and of good form, with attractive buds ('Caroline Testout' × 'Soleil d'Or'). Very robust and hardy, with erect branches, raised by N. Perner Ducher. (The 'Daily Mail' Rose.)—*C. T. D.*

Rose Mildew (*Agr. Gaz. N.S.W.* p. 1042). — This disease is checked by dusting with flowers of sulphur mixed with one-third its volume of lime, or spraying with lime-sulphur, potassium sulphide, or 1 part of sulphuric acid in 1500 parts of water.—*S. E. W.*

Ruellia Harveyana (*Bot. Mag.* tab. 8485).—Mexico. Family, *Acanthaceae*, tribe *Ruellieae*. Herb, perennial. Stems slender. Leaves 2–3 inches long. Flowers, corolla pale lilac, 2 inches across. *G. H.*

Ruscus, Danae, and Semele phylloclades. By Gustav Danek (*Beih. Bot. Cent.* Bd. 29, Abt. 1, Heft 3, pp. 357–408; 2 plates; 13 figs.).—The author finds that the nervation of *Ruscus*, *Danae*, and *Semele* phylloclades shows that these organs consist of two parts which are of different origin morphologically, and confirms Velenovsky's theory on the subject.

The leaf-like organs in the bract axils on *Danae* are true terminal leaves ending a short branch. The flower-bearing phylloclade of *Ruscus* consists of an axis which ends with a terminal inflorescence; one of the bracts of the first flower is very much enlarged and united to the axial part. The barren phylloclade of *Ruscus* is a terminal leaf.

Myrsiphyllum and *Asparagus* have true phylloclades—that is, these are caulome structures—but those of *Semele* are like those of *Ruscus*. The anatomy of these organs confirms these conclusions, as also do the abnormal cases described by the author in which the two original parts which go to form the phylloclade remained separate. Many transitional states were found by the author, of which some are figured.—*G. F. S. E.*

Salicornia, The Anatomy of the Genus. By Ethel De Fraine, D.Sc., F.L.S. (*Jour. Linn. Soc.* vol. xli. No. 282, pp. 317–348, July 1913; with 2 plates and 14 text figures).—The morphological distinction of leaf and stem has been variously interpreted by different authors who have studied the structure of these succulent inhabitants of the sea-shore. Babington, Bentham, and Hooker consider the plants to be leafless and regard the fleshy internodes as composed of succulent stem cortex. De Bary believed the leaves to be represented by the small free tips on the succulent stem which are decussately arranged. Duval-Joune regarded the so-called "outer cortex" of the stem as foliar in character.

Dr. De Fraine has reached the same conclusion as Duval-Joune and she bases this conclusion upon a careful consideration of:—

(*a*) The development of the shoot behind the apex.
(*b*) The anatomy and the course of the vascular bundles.
(*c*) The structure of the flowering shoot.
(*d*) The leaf-fall.
(*e*) The morphology of the seedling.
(*f*) The morphology of species of allied genera.

Besides this principal result of her research Dr. De Fraine also records a number of other interesting features in the histology and anatomy of Salicornia, such as the existence of transition forms between the spiral tracheids and stereids; the formation and character of the aerenchyma, &c.—*R. B.*

Salix zygostemon and S. Medemii var. longifrons. By J. Bornmueller (*Gartenflora*, vol. lxii. pt. xi. pp. 242–245).—*Salix zygostemon*, from the West of Persia, is perhaps a natural hybrid of

S. purpurea and *S. Medemii*. The young twigs have yellow bark, and the new leaves show silky hairs. A new variety of *S. Medemii* (*longifrons*), with long, narrow leaves, has been found in Persia.

S. E. W.

Sansevieria aethiopica (*Bot. Mag.* tab. 8487).—S. Africa. Family *Liliaceae*, tribe *Dracaeneae*. Under-shrub, succulent. Leaves 13–30, 5–16 inches long. Inflorescence 16–30 inches long. Perianth white, tube 1 inch long, lobes ¾ inch long, revolute.—*G. H.*

Saprophytes of Java, Contributions to our Knowledge of By A. Ernst and C. Bernard (*Ann. Jard. Bot. Buit.* ser. ii. vol. xi. pt. ii. 1912).

X. A systematic description of *Burmannia coelestis* Don. By J. J. Smith. (Pp. 219–222; with 1 plate.)—A detailed description of the systematic characters and habitat of this plant. This species is usually described as an annual, but the author believes it to be perennial.

XI. External and internal morphology of *Burmannia coelestis* Don. By A. Ernst and C. Bernard. (Pp. 223–233; 1 plate.)—This species differs from those described by the authors in previous communications in being non-saprophytic, and in its tissues containing chlorophyll. Most of the morphological and anatomical features of *B. coelestis* are such as might be anticipated from its manner of life. It possesses a normal root system, although without root hairs. The adventitious and lateral roots contain a fungus, especially in the epidermal cells. The epidermis of the stem is furnished with stomata; its inner and outer cell-walls are thickened and its surface is covered by a well-marked cuticle. The stomata have no subsidiary cells.

The structure of the leaf of *B. coelestis* is in accordance with its function as an assimilatory organ, and in this respect differs essentially from the greatly reduced scale leaves of the saprophytic species.

XII. Developmental history of embryo sac, embryo, and endosperm of *Burmannia coelestis* Don. By A. Ernst and C. Bernard. (Pp. 234–257; with 4 plates.)—The archesporial cell becomes, without previous division, the embryo sac mother-cell, and this, as a rule, becomes directly the embryo sac itself. This species therefore forms the last link in the chain of reduction running through the family of Burmanniaceae as regards the tetrad-division.

The egg-cell and two synergidæ are formed at one extremity of the embryo sac and three antipodal cells, only slightly or not at all differentiated from one another, occupy the other end of the sac.

In *B. coelestis* the embryo and endosperm develops without previous fertilization, and in this respect resembles the apogamous species of *Alchemilla*, *Wikstroemia indica*, &c. It is peculiar,

however, in the frequent development of two or even three embryos from the cells of the egg-apparatus.

Embryo-formation precedes endosperm development in *B coelestis*.

In place of the usual two polar nuclei, groups of three to five nuclei were met with in a few cases.

The fully-developed seed contains about thirty endosperm-cells.

R. B.

Sarcochilus unguiculatus L. By E. Miethe (*Orchis*, vol. vi. pt. vi. pp. 101–102; 1 plate).—This orchid, also known as *Thrixspermum unguiculatum*, bears pale yellow flowers with purple streaks. It has no definite flowering period. The flower stem contains about 20 buds, not more than five of them open at the same time. This takes place in the early morning; by noon they have lost their strong perfume and soon fade away.—*S. E. W.*

Sarracenia Hybrids. By A. Hefka (*Oestr. Gart. Zeit.* vol. viii. pt. ii. pp. 42–43; 1 fig.).—*S.* × *Vogeliana* (*Courtii* × *Stevensi*) is a strong growing form resembling its parents. *S. Laschkei* (*Courtii* × *Mooreana*) is weaker in growth than *Mooreana*. *S.* × *Diesneriana* (*Courtii* × *flava*) is quite distinct from its parents, having leaves 12 inches long, greenish-yellow to brown in colour.—*S. E. W.*

Saxifraga Aizoon, cochlearis, and lingulata. By F. Mader (*Gard. Chron.* August 23, 1913, p. 134; 1 fig.).—Notes on these three species as found in the Maritime Alps.—*E. A. B.*

Saxifraga Aizoon, cochlearis, and lingulata. By R. Farrer (*Gard. Chron.* Sept. 27, 1913, p. 213).—Further note on the same species.

E. A. B.

Saxifraga Stribrnyi (*Bot. Mag.* tab. 8496).—Bulgaria. Family *Saxifragaceae*, tribe *Saxifrageae*. Herb, tufted. Leaves rosulate, 1 inch long, fleshy, glaucous. Inflorescence cymose, 4 inches long. Flowers nodding, ½ inch long; calyx reddish-purple; petals carmine.—*G. H.*

Schomburgkia. By R. Schlechter (*Orchis*, vol. vii. pt. iii. pp. 38–43).—The Schomburgkias are divided into two classes, *Eu-Schomburgkia* with short racemes and long bracts, and *Chauno-Schomburgkia* with short bracts and branching inflorescence.

The following varieties of *Eu-Schomburgkia* are in cultivation:

S. crispa Lindl., closely allied to *S. marginata*, and *S. undulata*, is a native of Guiana. The petals and sepals have a yellowish-brown colour, and the labellum is pale violet-pink. *S. Lyonsii* Lindl. is found in Jamaica and Cuba at 3000 feet above sea level. It has white flowers, marked with violet. *S. marginata* Lindl. is somewhat similar to *S. crispa*. The flowers are larger, the petals and sepals are brown, with paler edges, and the lip is white, with a touch of red at the tip. *S. rosea* Lindl. is a beautiful Orchid from the mountains

of Venezuela. The petals and sepals are deep red, but the bracts, stalk, and lips are pink. *S. undulata* is difficult to distinguish from *S. marginata*. It comes from New Granada, and is found at an altitude of 2200 feet. The petals and sepals are brown, and the labellum is violet red.

S. Wallisii occurs in New Granada and Peru about 4000 feet above the sea. The flowers are yellowish-brown, with white lips.

Chauno-Schomburgkia.—*S. Galeottiana* is a native of Mexico and Yucatan, and closely resembles *S. tibicinis*, but the flowers are brighter. *S. Humboldtii* is a large-flowering variety from Venezuela. *S. lepidissima* has a stem 3½ feet long, with dark red flowers. *S. Sanderiana* is perhaps identical with the above variety. *S. tibicinis*, from Central America, has a long stem bearing panicles of large flowers. The petals and sepals are waved, brownish-red in colour, with white lips, and are edged with red. *S. Thomsoniana*, a native of the West Indies, has small yellow flowers and a red labellum. *S. campeacheana*, a native of Central America, is probably a natural hybrid of *S. undulata* and *S. Thomsoniana*. *Schombocattleya spiralis* is the only known hybrid obtained from the pollen of *Schomburgkia*.—*S. E. W.*

Schools of Agriculture and Domestic Economy in Wisconsin. By A. A. Johnson (*U.S.A. Dep. Agr. Office of Exp. Stns., Bull.* 242. 1 map, 5 plates).—An account of the Agricultural Trade Schools in Wisconsin. On page 6 we read "These schools . . . have for their sole object the educating of farmers' boys and girls who do not wish to take an extensive college course, but who are anxious to get that form of training which will be most useful to them when they take charge of the home farm or the farm home."

Each school is described and photographic illustrations are given. The curriculum is also stated.

Pages 19–24 give statistics relating to the cost of maintenance and number of students in attendance, together with the law relating to these schools.—*W. W.*

Seeds of Compositae and other Orders, Germination of the. By Hans Bocker (*Beih. Bot. Cent.* Bd. 29, Abt. 1, Heft 1, pp. 21–143 ; with 23 figs.).—In this paper, the author gives a very full account of experiments in the germination of fruits and seeds of those species in which there are two or more kinds of fruit and seed. But besides this, which is the main subject of his researches, there are many interesting observations regarding the differences in percentage germination in light and in darkness, and of seeds freed from the pericarp as compared with others in their natural state.

Some fifty-three plants were fully examined, of which those most interesting to horticulturists will probably be *Calendula*, *Catananche*, *Chrysanthemum*, *Galinsoga*, *Layia*, *Rhagadiolus*, *Sanvitalia*, and *Zinnia*.

Three Cruciferae and three Chenopodiaceae (*Atriplex* and *Oxyris*) were also examined.

The following table gives some results of the author's experiments:

	Date.	In Light.		In Darkness.	
		Disc Fruits. Per cent.	Ray Fruits. Per cent.	Disc Fruits. Per cent.	Ray Fruits. Per cent.
Dimorphotheca hybrida, seed partly freed of pericarp	Nov. 14 to Dec. 29	20	58	17	45
	Feb. 26 to April 8	81	84		
Ditto wholly freed of pericarp	Nov. 14 to Nov. 24	56	78		
Gutierrezia gymnospermoides	April 9 to May 9	93	92		
Heterotheca Lamarckii	April 9 to Oct. 19	41	25		
Buphthalmum salicifolium	Feb. 19, 1910 to Jan. 30, 1911	46	56	43	47
Zinnia elegans	Jan. 11, 1910 to Feb. 4, 1910	63	48 and 45	62	47 and 58
Ximenesia encelioides	Nov. 26, 1909 to Jan. 25, 1910	61	49	58	39
Synedrella nodiflora	Feb. 1 to Aug. 12	58	51		
Layia elegans	Nov. 9, 1910 to Jan. 30, 1911	58	35		
		88	74		
L. platyglossa	,,	72	71		
L. heterotricha	,,				
Chrysanthemum segetum grandiflorum	Dec. 30, 1909 to Oct. 19, 1910	61	32	53	15
C. coronarium	April 8 to May 10	67	62	70	70
C. frutescens	Jan. 20, 1910 to Jan. 30, 1911	59	5	31	1
Hypochoeris glabra	April 12 to May 18	93	100		

There are many other results of experiments mentioned in this paper which should prove of considerable value to those who are interested in the propagation of seed. Thus, in many cases, the removal of the pericarps greatly assisted germination, raising the percentage from 17 and 35 per cent. to 52 and 74 per cent. (central and marginal florets) with *Dimorphotheca*. Also, with *Chrysanthemum viscosum*, the effect of removal of the pericarp was to raise the percentage of germination of the marginal florets from 23 per cent. to 98 per cent. *Thrincia* and *Geropogon* showed similar results.

Treatment with nitric acid diminished the percentage of germination. In the case of *Dimorphotheca pluvialis*, 88 per cent. central and 51 per cent. marginal germinated in ordinary air, and 99 per cent. and 91 per cent. respectively in 100 per cent. Sauerstoff. In other experiments, however, with the same plant 100 per cent. germinated in ordinary air. An atmosphere of hydrogen diminished the percentage of germination in the same plant.

A curious result was obtained with seeds of *Catananche lutea*. In light 64 per cent. of the aerial and 80 per cent. of the subterranean

fruits germinated, whilst in darkness 84 per cent. of the aerial and 77 per cent. of the subterranean were found to do so.

Of *Zacintha verrucosa*, 96 per cent. of the central florets germinated and 94 per cent. of the marginal when the covering bract was removed, but only 18 per cent. when it was not removed.

Rhagadiolus stellatus has four different kinds of fruit, but 100 per cent. of each germinated.

With *Rapistrum rugosum* there are one large upper and a small lower seed in each fruit. Of the former 84 per cent. and of the latter only 46 per cent. germinated. Removal of the capsule wall increased the percentage of germination.

There are many other special results which might be mentioned, but unfortunately the author's results considered as general rules are extraordinarily conflicting, and even what has been given in this abstract cannot be taken as a guide to propagators.—*G. F. S. E.*

Seeds, Germination of Packeted. By Edgar Brown (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ.* 101 ; Sept. 16, 1912 ; tables).—In the interests of the small private grower some seed-testing experiments have been carried out and tables are here given showing the percentages of germination of :—

1. Seeds bought from retail merchants in coloured packets without grower's name.

2. Seeds ordered by post from a wholesale seedsman after consulting his catalogue.

In both these classes the percentage of live seed was lower than it should have been ; in the case of the first, which are here called " box seeds," disgracefully so. In this case, the seeds being put up in showy packets and sold through local general merchants, no one's reputation is at stake, and there is no question of acquiring satisfied customers for any special firm.

It is asserted that the sale of packeted vegetable seeds will not be on a proper basis until each packet is labelled with the percentage of live seed which it contains.—*M. L. H.*

Senecios, New. By Kache (*Gartenflora*, vol. lxii. pt. viii. pp. 172–176 ; 2 plates).—*Senecio clivorum* occurs in Hupé (China) and in Japan. It forms a bush 3 feet high, with large round leaves, and bears a large number of yellow stellate flowers in July.

S. tanguticus, discovered in Hupé, is a rapid grower, attaining a height of 4½ feet. The large leaf is pinnatipartite. The yellow flowers are borne in panicles from the middle of August to September. This plant is best grown in groups, with plenty of space, as it spreads rapidly by means of underground runners.

S. Veitchianus, introduced from Hupé, is the most imposing in appearance of the family. The flower spikes, 6 feet high, are covered with golden blooms for weeks, from the beginning of July.

S. Wilsonianus resembles *S. Veitchianus* ; the leaf is reniform, and the flowers yellow. These Senecios require plenty of nourishment and moisture, but need no protection in winter.—*S. E. W.*

Senecio stenocephalus (*Bot. Mag.* tab. 8472).—China and Japan. Family *Compositae*, tribe *Senecionidae*. Herb. Leaves radical, long-petioled; blade reniform, 9 inches long, 16 inch across, coarsely toothed. Racemes 14 inches long, $2\frac{3}{4}$ inches wide at base. Flowers yellow; from tip to tip of rays, $1\frac{1}{2}$ inch across.—*G. H.*

Sequoias, Giant. By L. Henry (*Rev. Hort.* Feb. 1, 1913; pp. 53–57; 1 illustration).—A very interesting article on the giant Sequoias (*Sequoia gigantea* Endl., syn. *Wellingtonia gigantea*) which attain a height of nearly 400 feet, a diameter of 50 feet, and a thickness of bark of 4 feet, and are estimated to be about 2000 years old.—*C. T. D.*

Shrubs in Wire Baskets. By H. Köhler (*Gartenflora*, vol. lxi. pt. xiii. pp. 285–287; 2 figs.).—In order to fill up gaps in the border, Roses, Pæonies, Buddleias, Ceanothus, and Fuchsias may be grown in wire baskets. They can be moved into the desired position even when they are in flower.—*S. E. W.*

Simarubaceae, Anatomy of. By Friedrich Boas (*Beih. Bot. Cent.* Bd. 29, Abt. 1, Heft 3, pp. 303–356; 8 figs.).—The author gives full details of the anatomy of 110 of the 189 species of this order. The Simarubineae are characterized by the presence of remarkable sclerenchymatous cells in the mesophyll, but there is no anatomical characteristic which is invariably found throughout the order. A new genus, *Hebonga*, is described, and new species of *Simaruba*, *Simaba*. *Castela Perriera* is placed under *Hannoa*.

Other changes in specific names on the ground of anatomical differences are also suggested.—*G. F. S. E.*

Smut in Wheat (*Agr. Gaz. N.S.W.* vol. xxiii. p. 394).—Corvusine is less effective as a bunt destroyer than treatment with a 2 per cent. copper sulphate solution and lime water; it also reduces the germinating power of the wheat to a greater extent.

Clarke's Carbolised Wheat Protector destroys smut, but affects germination to a greater extent than copper sulphate.—*S. E. W.*

Soil Biology. By G. L. Fawcett (*U.S.A. Exp. Stn., Porto Rico, Ann. Rep.* 1911; pp. 37, 38).—In the course of investigations into the bacteriology of "sick" soils it was found that in two of the worst soils in this respect there was a complete absence of protozoa, though bacteria were abundant. Though it was obvious that any good results to be derived from the disinfection of these soils cannot be due to the destruction of the protozoa, yet canes planted in boxes of the disinfected soil gave a much more vigorous growth than those planted in soils not disinfected.—*A. P.*

Soils, Effect of Strongly Calcareous, on the Growth and Composition of Plants. By P. L. Gile (*U.S.A. Exp. Stn., Porto Rico, Ann. Rep.* 1911; pp. 20, 22).—Investigations are in progress to determine the adaptability of various plants to such soils. Excess or

lack of lime is a predominant chemical feature of Porto Rican soils, so that sugar cane and pineapples become chlorotic in the former case and many plants suffer from soil acidity in the latter. The growth of rice appears to be much depressed by excess of lime in the soil, and other plants that become chlorotic under these conditions are being studied with a view to the confirmation of the theory that chlorosis is due to disturbance in the mineral nutrition of the plants caused by the large amount of calcium carbonate in the soil.—*A. P.*

Soy Beans, Varieties in Bengal, &c. By E. J. Woodhouse and C. S. Taylor (*Mem. Dep. Agr. India, Bot. Ser.* vol. v. pp. 103–176; March 1913; plates).—An account of the varieties of this important bean, found in Bengal, Bihar, and Orissa, with notes on their composition. Six types and three sub-types are described. The cultivation of the soy bean has not reached any magnitude so far in northern India, but the authors consider the difficulties in the way of its increased production by no means insurmountable.—*F. J. C.*

Spraying (*Agr. Gaz. N.S.W.* vol. xxiv. pt. ii. p. 151).—Large numbers of apple trees have been destroyed by injudicious spraying with red oil emulsion.—*S. E. W.*

Sterilization, Partial, of Soil for Glasshouse Work. By E. J. Russell and F. R. Petherbridge (*Jour. Bd. Agr.* vol. xix. No. 10 pp. 809–827; 9 figs.).—The results are given of a number of experiments carried out in continuation of the work described in the *Jour. Bd. Agr.* vol. xviii. No. 10, 1912.

In addition to the action of steam and dry heat on tomato-sick soil, that of a large number of antiseptics has been investigated. These belong to six groups, viz.: (1) volatile hydrocarbons; (2) heavy hydrocarbons; (3) tar acids; (4) tar bases; (5) formaldehyde; (6) inorganic antiseptics. "Some objections may be found to all the substances in these groups. We have not yet met the ideal combination of qualities in any one substance, and the grower's choice must be determined by three considerations—effectiveness, convenience, and price." The best, so far, would appear to be formaldehyde. It is interesting to note that an experiment arranged to see if anything would be gained by raising plants in soil heated to 130° F. (on which retardation of early growth does not set in), and afterwards potting them into steamed soil, failed, because, on the particular lot of steamed soil no retardation appeared, but on the contrary acceleration of seedling growth.

An experiment with cucumbers was carried out in a house belonging to a market grower with the object of comparing old rejected "sick" soil, both steamed and untreated, with virgin soil. Steamed virgin soil gave the best results, and untreated old sick soil the poorest. Old sick soil sterilized behaved very much like virgin soil unsterilized.

As the result of an experiment on pot vines it would appear that partial sterilization is the proper method of dealing with vine-sick

soils. Incidentally it is shown that soil which has never grown vines may be vine-sick.

The authors extended their experiments with Chrysanthemums, the results being practically invariably in favour of partial sterilization, though the different varieties were not unanimous in their choice of the sterilizing agent.—*A. S.*

Stocks, Summer 'Excelsior.' By F. Bloc (*Rev. Hort.* July 16, 1912; p. 328; 1 illustration and coloured plate).—The plate represents two very fine forms, one a rich magenta with lighter margins, and the other rich mauve with lighter margins, and very large, well-made flowers.—*C. T. D.*

Strongylodon pseudolucidus (*Bot. Mag.* tab. 8494).—Madagascar. Family *Leguminosae*, tribe *Phaseoleae*. Climbing shrub. Leaves 3-foliolate, 5 inches long. Raceme 5 inches long, 3-flowered at each node. Flower 1½ inch long, crimson.—*G. H.*

Stumps, Blowing with Dynamite. By George Roberts (*U.S.A. Exp. Stn., Kentucky, Bull.* 154; June 1911; plates).—There are in various parts of Kentucky areas of considerable extent which are still "in the stumps." This is of course a state of things inconvenient for the use of agricultural machinery and wasteful in space. Stumps are sometimes burned, sometimes pulled, sometimes left to rot, but all these courses have their drawbacks, and the writer shows by the results of actual experiment that the cheapest and quickest method of removing them is by the use of dynamite.—*M. L. H.*

Sugar Cane, The Chlorosis of. By P. L. Gile (*U.S.A. Exp. Stn., Porto Rico, Ann. Rep.* 1911; pp. 20, 21).—The bleached cane seems to be confined to patches of very calcareous soil, no cases having occurred in the acid red clays, but green cane has been observed on patches of soil containing as much carbonate of lime as the soil growing chlorotic cane. The leaves of a few high stools in the midst of a strongly affected patch were brushed with a solution of ferrous sulphate and after a few days the leaves became much greener. After several applications of the solution these leaves were killed, but perfectly normal green leaves started out from the top of the canes. Further experiments, both in spraying and in applying iron to the soil, are in progress.—*A. P.*

Sweet Peas, American and Telemly. By A. Trebst (*Gartenflora*, vol. lxi. pt. xvii. pp. 378–381).—The Telemly sweet pea from Algiers begins to flower in March. The dark red varieties are specially valuable, as the American *L. odoratus praecox* does not yield these colours. Unfortunately the Telemly sorts do not come true from seed, whereas about 90 per cent. of the American do. To ensure a continuation of flowers, podding must be absolutely prevented.

S. E. W.

Sweet Pea, Diseases of. By J. J. Taubenhaus and T. F. Manns (*Gard. Chron.* July 12, 1913, pp. 21–25; with 12 figs.).—Descriptions

of the appearance of affected plants in America, and of experiments to discover the identity of the organisms responsible.

1. *Mosaic Disease* can be induced by punctures with a needle infected by diseased tissues. Apparently spread by means of green aphids. Organism unrecognized.

2. *Root Rot.—Thielavia basicola* placed on healthy roots in sterile soil produces root disease, but it does not work up stems for more than 3 inches, and therefore is thought to be distinct from the cause of streak.

3. *Root Rot.—Rhizoctonia* or *Corticium vagum* differs from the following in its browning effects and frequently quite destroying the roots; also in Tomato, Lettuce, and Tobacco.

4. *Stem or Collar Rot.—Sclerotinia Libertiana* affects seedlings, attacking the collar. A soil organism affecting clover and introduced with animal manure.

5. *Root Rots.—Fusarium* species not yet identified. Seedlings affected suddenly collapse; the central woody region of roots easily pulls out from bark.

6. *Root Galls* due to the eel-worm, *Heterodera radicicola.*—A common greenhouse trouble. Affect many other plants; form galls smaller and longer than the normal root nodules.

7. *Bud Drop.*—Due to too highly nitrogenous food. Application of phosphoric acid and sulphate of potash cured within a week.

8. *Anthracnose.—Glomerella rufo-maculans* also causes bitter rot of Apple. May attack seedlings; spreads rapidly in the field; can be carried to Peas from Apple.

9. *Powdery Mildew.—Erysiphe polygoni*, according to Massee, so far not identified in America. Occurs in greenhouse and on low wet land.—*E. A. B.*

Sweet Pea: Streak in Sweet Peas and Clover. By T. F. Manns and J. J. Taubenhaus (*Gard. Chron.* April 5, 1913, p. 216).—Describes experiments resulting in the isolation of, and successful cross-inoculation with, a new species of *Bacillus* named *B. lathyri* by the authors, and considered by them the cause of Streak disease in Sweet Peas.

E. A. B.

Sweet Peas, Winter-flowering. By P. Schmidt (*Oestr. Gart. Zeit.* vol. vii. pt. xi. pp. 425–428).—Sow the seed of *Lathyrus odoratus praecox* in boxes in the middle of July, transfer the seedlings in the middle of August to the border in the greenhouse, enriching the soil with well-decayed cow-dung. The temperature of the house should not exceed 55° F. The flowers will be ready for cutting at Christmas. The best varieties are: 'Christmas Meteor,' scarlet; 'Christmas Pink,' white and pink; 'Flamingo,' scarlet; 'Florenze Denzer,' pure white, one of the best; 'Greenbrook,' white, with lavender edge; 'Le Marquis' and 'Mrs. C. H. Totty,' blue; 'Mrs. Dolansky' and 'Mrs. Will Sim,'

salmon ; 'Mrs. W. Smalley,' pink ; 'Mrs. E. Wild,' carmine ; 'Mrs. A. Wallace,' pink, changing to lavender.—*S. E. W.*

Sweet Potato, Dry Rot. By L. L. Harter and E. C. Field (*Phytopathology*, ii. p. 121 ; June 1912 ; figs.).—The dry rot of the sweet potato has been already described and attributed to *Phoma batatae ;* the authors show that this fungus has another and higher form in *Diaporthe batatatis.—F. J. C.*

Tabaschir and the Greek Saccharon. By Dr. Carl Curt Hosseius (*Beih. Bot. Cent.* Bd. 30, Abt. 2, Heft 1, pp. 88–109).—The author, after a critical study of the question, concludes that tabaschir is the solid siliceous material found within the stems of various Bambuseae. It occurs in commerce either as crude or calcined tabaschir. He holds that Tschirch's Tabaschir I. does not exist, and denies this author's explanation as to its origin. It is used as food in India, not as medicine. Bamboo manna contains no mannite, and should be described as Bamboo sugar. It is probable that Bamboo sugar is produced by external causes, *e.g.* insect injury. Water is sometimes found in Bamboo stems, which in Siam is due to the soil. The Greek σάκχαρον was simply cane sugar and its products, including the officinal sugar-candy.

The pieces of bamboo in candied sugar were simply used instead of threads during the process of manufacture.—*G. F. S. E.*

Timber, Increasing the Durability of (*Jour. Bd. Agr.* vol. xx. No. 4, pp. 307–310).—The question of the cost of creosoted as compared with that of untreated timber, and the relative value of the process in its application to timber of various kinds, is dealt with.

A. S.

Tobacco, British-grown. By R. Ellis (*Jour. Bd. Agr.* vol. xix. No. 11, pp. 904–908).—A brief history of tobacco-growing in Britain from its first introduction until the autumn of 1912.—*A. S.*

Tobacco, Cultivation of, for Preparation of Fruit and Hop Washes (*Jour. Bd. Agr.* vol. xix. No. 12, pp. 985–994).—A compilation of general information for the guidance of any growers who may contemplate the growth of tobacco, with a view to the preparation of fruit or hop washes for their own gardens or orchards. The recommendations made are largely based on the results obtained in experiments conducted at Wye College, in Kent, during the seasons 1910–1911.—*A. S.*

Tobacco, Culture of, in Ohio (*U.S.A. Agr. Exp. Stn., Ohio, Bull.* 238 ; March 1912 ; plates).—An account of the tobacco crop in Ohio, with tables and shaded maps showing the comparative quantities of the different types of tobacco grown in different districts in the State.

The various cultural and curing methods in use in the different

centres are described, and a history and description given of each variety of tobacco grown in Ohio.—*M. L. H.*

Tobaccos of the United States. By E. H. Mathewson (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 244; Nov. 23, 1912; plates and maps).—A full description and statistical account of the tobacco crop all over the United States. The bulletin is written more from the point of view of the trader and Revenue Department than of the agriculturist, but it describes every strain of tobacco grown in North America, all the different methods of curing and preparing the leaf for market which produce the different brands, with an explanation of and a suggested origin for the trade names borne by the crop in every stage of its growth. The introduction gives a general history of tobacco-growing in America, and refers to the various alterations and vicissitudes which the export trade has undergone through the policy of Great Britain in the early Colonial days, through over-production, through wars at home and abroad, and through European complications.

Tables are then given of the yearly output of each State, and the crop is analysed into wrapper, leaf-binder, filler plug tobacco, chewing tobacco, &c., this part of the subject being illustrated by large folding maps coloured in different shades to show the dominant type of tobacco grown in each district.

There are many illustrations of the leaf in all stages of preparation, of growing and harvesting operations, and of the various styles of building and appliances used in the different centres.—*M. L. H.*

Transpiration and Varying Density of Solution. By George Bonyoncos (*Beih. Bot. Cent.* Bd. 29, Abt. 1, Heft 1, pp. 1–20; with 3 figs.).—The author grew wheat seedlings both in water and in sand and soil cultures, and used the following varying concentrations of a complete nutrient solution:—93·5, 187·5, 375, 750, 2250, 4500 parts per million.

He found that in all cases both the rate of growth and grams of dry matter produced (after the first four or five days) increased with increase in density of the solution. The transpiration of the seedlings is certainly affected by the degree of density of the nutrient solution. The number of transpirations required for every gram of dry matter formed increased with the density from 0 to from 93·5 to 375 parts per million, but then decreased.

The author suggests that the osmotic strength of the cell-sap increases with the density of the solution, and tested this theory by extracting the cell-sap and examining its osmotic strength by the electrical resistance as found by means of the Wheatstone bridge and by determination of the freezing-point.

He found a greater concentration of the cell-sap with an increase in density of the solution.

Dilute solutions stimulate transpiration. The actual dry matter produced was largest in the plants grown in solutions, and larger in

the sand than in the soil cultures; but relative transpiration was greatest in soil cultures, and less in solutions than in sand cultures.
G. F. S. E.

Trees for Parks and Gardens. By G. Heick (*Gartenflora*, vol. lxii. pt. viii. pp. 176–180).—*Juniperus communis*, *Ilex Aquifolium*, and *Euonymus europaeus* are recommended for a place in the park and garden.—*S. E. W.*

Tropaeolum Hybrids. By H. Fischer (*Gartenflora*, vol. lxii., pt. xii. pp. 278–282; 1 plate).—The seed of *Tropaeolum pinnatum* (a hybrid of *T. minus* and *T. peregrinum*) yields two types of flowers, viz. *bimaculatum* with red markings and *luteum*, as well as some dwarf forms. The hybrids produce masses of flowers, but very little seed. They can easily be increased from cuttings. The fertility of these plants can be increased by increasing the amount of carbonic acid in the atmosphere in which they are grown.—*S. E. W.*

Umbelliferae, Mechanical System of. By George Funk (*Beih. Bot. Cent.* Bd. 29, Abt. 1, Heft, 2, pt. 219–297; 5 plates).—The author describes in full detail the general system of mechanical support in the leaf and stem of this Family. He shows how the various cell-forms are connected, and explains the location of the mechanical tissues. The degree of dorsiventrality to be found in the rays of the umbels shows much variation. He thinks that the cause of dorsi-ventral structure is to be found in the effect of light and gravity.

In *Daucus*, *Oenanthe*, and *Chaerophyllum*, only one side of the main stem shows woody thickening of the subepidermal collenchyma, which is analogous to the tension and pressure sides (due to storm) of the outside trees in a fir plantation. The author examined also the differences in mechanical structure found in individuals grown in different habitats and of the various species of one genus. He finds a competition for the outside situation (under the epidermis) between the assimilatory and the strengthening tissue, both of which try to extend as widely as possible in this situation, and discusses the degree in which this is influenced by the environment.

He also describes the development of mechanical tissue in the stem and leaves. So long as the stem is in growth, the peripheral strengthening tissue consists of collenchyma. It is only when the fruit is nearly ripe that the final mechanical-strengthening system is attained.—*G. F. S. E.*

Varieties, Renaming of. By Philippe Revoire (*Rev. Hort.* Aug. 1, 1912; pp. 349–50).—A strong protest against the renaming, as if of new varieties, of already well-known ones, particularly in America, where, for instance, a long-established (twenty years) and well-known rose, 'Antoine Revoire,' of French origin, has recently been put forward as a novelty under the name of 'Mrs. William Taft,' while another, 'Leuchtfeuer,' has appeared as 'Mrs. Taft's Rose,' while several other

instances of similar character are quoted, involving injustice both to the raisers and the horticultural public.—*C. T. D.*

Vine, Black Spot. By M. Blunno (*Agr. Gaz. N.S.W.* vol. xxiii. pp. 449, 450).—A winter dressing against black spot of the vine is prepared by adding ¾ of a pint of pure sulphuric acid to a gallon of water. Apply to the stems before the buds begin to open. Spraying with Bordeaux mixture in spring and early summer is advisable.

S. E. W.

Vines. By M. Blunno (*Agr. Gaz. N.S.W.* vol. xxiv. pp. 331–339; 22 plates).—Illustrations are given of six ways of pruning vines.—*S. E. W.*

Vines. By M. Blunno (*Agr. Gaz. N.S.W.* vol. xxiv. pt. i. pp. 61–71, 6 figs.).—In Australia a vineyard is planted with cuttings or rooted cuttings. The cuttings may carry eight or ten buds, and are planted about 14 inches deep and 7 feet apart. Imported cuttings are placed in cold water for six hours and are then immersed for twelve hours in a solution of soft soap (10 lbs.), potassium sulpho-carbonate, 32° Beaume (3 gallons), in 100 gallons of water. To induce the cuttings to make roots, the bark of the lower end of the cutting is scarified with a curry-comb, so as to uncover the cambium.—*S. E. W.*

Vines, Budding. By M. Blunno (*Agr. Gaz. N.S.W.* vol. xxiii. pp. 617–624; 9 figs.).—The operation of budding the vine is shown in nine illustrations.—*S. E. W.*

Water Weeds, Destruction of (*Jour. Bd. Agr.* vol. xix. No. 3, pp. 216–218).—The use of copper sulphate for the destruction of algæ in ponds is described.—*A. S.*

Weed Seeds, The Destruction and Dispersal of, by Wild Birds. By W. E. Collinge (*Jour. Bd. Agr.* vol. xx. No. 1, pp. 15–26).—A summary of a large number of experiments is given, and the author is led to the conclusion that, although many writers have said that seed-eating birds are as a class beneficial, they really are not, seeing that, to a much greater extent than is generally supposed, they act as distributors of the seeds of weeds.—*A. S.*

Wood Pigeons. By R. S. MacDougall (*Jour. Bd. Agr.* vol. xx., No. 6, pp. 510–513).—The appearance and habits of the Wood Pigeon (*Columba palumbus*) and the Stock Dove (*Columba aenas*) are described, and methods of reducing their numbers in localities where they are troublesome are given.—*A. S.*

Woody Aster. By S. K. Loy (*U.S.A. Exp. Stn., Wyoming, Ann. Rep.* 1911–12; pp. 58, 59).—The poisonous principle of the plant has not as yet been worked out and seems to defy the ordinary methods of extraction (p. 29). Salicylic acid has been found to be present in the plant to the extent of 4 per cent., and the author thinks that this

together with the high percentage of alkali metals, would be sufficient to cause death to a sheep eating of the plant to any extent.—*A. P.*

Xylobium. By R. Schlechter (*Orchis*, vol. vii. pt. ii. pp. 21–24).—The author gives a list of the varieties of *Xylobium* in cultivation: *X. brachypus*, from Nicaragua, has pear-shaped pseudo-bulbs; the flowers are somewhat larger than those of *X. squalens*. *X. brachystachum*, a native of St. Catharina, in South Brazil, is little known. *X. bractescens*, a Peruvian Orchid, bears yellow flowers with a red-brown lip. *X. Buchtienianum* has a flower stem 10 inches in height with 12 flowers. The colour is not known. The plant comes from Peru. *X. Colleyi*, from the West Indies, bears 3–5 red-brown flowers with purple spots. *X. coelia*, Rolfe, is a native of Columbia, resembling *X. squalens*. *X. concavum*, from Guatemala, has pale yellow flowers, smaller than *X. bractescens*. *X. corrugatum*, from Venezuela; the flower stem is about 5 inches high, bearing 3–7 brownish-purple blooms. *X. elongatum* is characterized by long cylindrical pseudo-bulbs. It bears from 10 to 20 pale yellow flowers with dark red labellum, and is a native of Central America. *X. foveatum* resembles *X. squalens*, but the flowers are straw-coloured. *X. hyacinthinum* is found in Venezuela, bears twenty pale yellow flowers which smell like hyacinths. *X. hypocritum*, Rolfe, is closely allied to *X. pallidiflorum*. *X. leontoglossum* is a strong grower from Columbia. *X. miliaceum* is a native of Bolivia. *X. palmifolium* has white or yellowish unspotted flowers (West Indies). *X. pallidiflorum*, a native of Venezuela, bears yellowish-white flowers. The flowers of *X. rebellis* are brown-red with brown spots. *X. scabrilingue* is recognized by its dark brownish-yellow flowers. The lip is covered with papillæ at the tip. *X. squalens* is a native of Venezuela. *X. stachyobrum* occurs in Costa Rica. It has long, oval pseudo-bulbs. *X. supinum*, from Peru, is identical with *X. squalens* according to some botanists. *X. truxillense* resembles *X. scabrilingue* and *X. supinum*. Little is known about *X. undulatum*, a native of Peru.—*S. E. W.*

Zygadenus intermedius. By F. W. Heyl, F. E. Hepner, and S. K. Loy (*U.S.A. Exp. Stn., Wyoming, Ann. Rep.* 1911–12; pp. 51–57; 2 figs.).—From the crude alkaloidal mixture obtained from the leaves of this poisonous plant (known as Death Camas), a crystalline alkaloid has been isolated which has been named Zygadenine. This substance melts sharply at 200°–201° C. and gave analytical results which correspond to the formula $C_{33}H_{59}NO_{10}$.—*A. P.*

Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H
(President R.H.S. 1885-1913.)

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PART III.

SIR TREVOR LAWRENCE, BART., K.C.V.O., ETC.

PRESIDENT OF THE SOCIETY, 1885–1913.

HOWEVER long the Royal Horticultural Society may be destined to uphold the standard of British Horticulture it can hardly be expected ever again to have a President who will experience so long or so prosperous a term of office as Sir TREVOR LAWRENCE has done. Nor is it likely that any future occupant of the office will ever surpass Sir TREVOR in his practical knowledge or in his whole-hearted love of Horticulture. Sir TREVOR is most widely known as a grower of Orchids, following in the steps of his mother, who was one of the first people to make a hobby of Orchids. As quite a young man, whilst he was serving in India, the verandah of the house which he built for himself at Dharmsala was always gay with Orchids, and at Burford he not only succeeded in gathering together a unique collection of all the now well-known species and varieties with conspicuous flowers which have made Orchids so deservedly popular, but he also eagerly collected every sort and kind down to the most insignificant with tiny blossoms, which most people would pass over, but which he himself delighted in, and of which he used to say that many of the smallest flowers displayed the greatest beauty, the most wonderful arrangement of their parts, and the most extraordinary adaptation to their circumstances. Probably no one in the world had such a knowledge of what are popularly called Botanical

species, or had anything like such a collection of them as Sir TREVOR LAWRENCE.

But, justly as he will always be renowned as a great Orchid grower, he was also quite as fond of his other plants. Speaking at a luncheon at his own house he once said : " When my friends say to me ' I think you grow Orchids ? ' I always say ' Yes, it is perfectly true ' ; but I always like them to understand that I take a warm interest in every class of flower and fruit and vegetable—in fact, in every branch of Horticulture. I should be very unwilling for my friends to suppose that I am entirely absorbed by Orchids and do not take an interest in all other plants as well." Thus, acquiring new introductions of all kinds from nurserymen and collectors all over the world, he made his garden at Burford, outdoors as well as under glass, a veritable storehouse of beautiful plants. Anthuriums and Cannas he grew with remarkable success, and of the former he raised many interesting new varieties ; while in the outdoor garden Crinums (the bulbs of *Crinum Powelli* have not been disturbed for thirty years), Gladiolus, Magnolias, Viburnums, the new Chinese Barberries, Lemoine's hybrid Philadelphuses, and other hardy flowering shrubs were among his special favourites. He managed to grow *Gerbera Jamesoni* out of doors, and his Japanese Irises were as fine as any to be found even at Wisley. His love of novelties extended to the kitchen garden also. He was the first to obtain a First-Class Certificate for Doyenné du Comice Pear, and many rare vegetables appeared at his table. He was often heard to express surprise at the very limited variety of vegetables to be usually found in our gardens, and the still more surprising limitation of our English methods of cooking them.

Amongst notable plants in the Burford Collection may be mentioned the difficult *Dendrobium Hookerianum*, which Sir TREVOR managed to perfection ; *Trevoria Chloris*, never since collected, which continues to flourish at Burford ; and a still vigorous plant of the original importation of *Odontoglossum crispum*. Of the beautiful blue *Dendrobium Victoriae-reginae*, of *Platyclinis filiformis*, of *Cirrhopetalum Cumingi*, of *Sophronitis grandiflora*, of *Oncidium incurvum*, and of innumerable others, Sir TREVOR'S collection contains wonderful specimens —wonderful both for the size of the plants, their age (many being more than 30 years old), and their manifest health and well-being. His success, especially with Orchids, was largely due to his own personal knowledge and oversight. His love of, and interest in flowers brought him friends and correspondents

in all ranks of life, and in every quarter of the globe, among them being the Right Hon. Joseph Chamberlain, a colleague in Parliament, who, during his strenuous labours at the Colonial Office, yet found time to exchange long holograph letters on Orchids with Sir Trevor. Among his "volunteer collectors" was his younger son, Capt. C. T. LAWRENCE, who, while stationed in West Africa, sent him home many rare or unknown species, including the bulbs of *Zephyranthes aurea*, a plant which by some unknown chance had become acclimatized in West Africa, and for which he obtained a First Class Certificate, and a *Listrostachys sp.* (unidentified at Kew) which was flowering at his death, despite an accident in transhipment which led to its spending no inconsiderable time in the water and on the shores of the Mersey before it was recovered. He knew every plant in his collection and his love of them survived to the last. Up to about a month before his death he used to be regularly wheeled through the garden and glasshouses, always carrying a sharp pair of scissors and cutting off a dead or diseased leaf here and there, and manifesting as great an interest and keen a memory as ever. The last plant on which his eyes rested was a basket of *Laelia Gouldiana*, carrying more than forty blossoms. It was taken into his room a day or two before he died, and after admiring its beauty he said "Take it back, the air of this room is not good for it." These blossoms were woven into the cross which was laid on his coffin.

Sir TREVOR was one of the most amiable of men, endowed with much of the old-fashioned courtesy of days gone by, without the formality and insincerity which too often underlay so much of that bygone courtesy. People who did not really know him were occasionally apt at first experience to think him a little "stiff" or "stand-offish"—for he had a certain reserved and dignified manner towards strangers, especially to any who attempted familiarity or rudeness; those who knew him well always regarded him as the very type of a perfect English gentleman as well as a most charming and lovable friend. Speaking in the Society's Hall after the international banquet of 1912, Monsieur Maurice de Vilmorin, one of the foremost horticulturists of the world, used the following words: "Your President has very quickly conquered all who have ever had the good fortune to be brought into personal contact with him—conquered them by the only force worth conquering with, the amiability and good grace of his charming personality." In presiding at meetings of the Society or of the Council he had a wonderful tact in pushing aside causes of irritation before they developed to a head.

Called to the President's Chair in 1885 in succession to Lord ABERDARE, he found the Society in very troublous times indeed, attributable to two chief causes: (1) the lavish expenditure on buildings at South Kensington erected on land of which the Society had no proper tenure, and (2) the degradation of the Society caused by a turning away from the pursuit of Horticulture to the promotion of London society entertainment gardens. Sir TREVOR'S inborn love of gardening taught him at once that a sort of imitation German Biergarten was by no means the ideal for the Royal Horticultural Society to aim at. And his practical experience told him that the upkeep of the vast buildings and garden at South Kensington (which then covered almost the whole area from the Albert Hall down to the Cromwell Road) was impossible in the then existing state of the Society's finances.

For two or three years he laboured to see if matters could in any way be mended. But it was hopeless (as we can now see) from the very first, and towards the end of 1886 he realized that nothing but the most drastic treatment would avail—the expenses of South Kensington must be cut off and the Society must return to the policy of its original institution, "Horticulture pure and simple," or the Society must die.

Some of the members of the Council, not being in entire sympathy with the President's views, retired, and at his suggestion much new blood was brought into the Council, together with a new Treasurer, the present Sir DANIEL MORRIS, K.C.M.G., and a new Secretary, the Rev. W. WILKS, both of whom were absolutely of the President's way of thinking on the necessity of retrenchment and a return to a purely horticultural policy. As a result of this, South Kensington was abandoned and Horticulture pursued. But even yet, the very existence of the Society was trembling in the balance. There were but 552 subscribing Fellows left, and the total annual income from all sources was less than £3,000 a year; and on these slender means the Society had to be newly built up and the garden at Chiswick maintained. The success of the new policy was not long, however, in declaring itself, and every year as it went by brought in the adhesion of new Fellows, and the progress of the old Society went on without a single set-back, so that, in 1904, the centennial year, Sir TREVOR had the joy of presiding at the opening of a New Hall in Vincent Square (due in great measure to the generosity of the late Baron Schröder) and also at the opening of a New Garden at Wisley, in Surrey, presented by Sir THOMAS HANBURY.

Sir TREVOR resigned the presidency on April 1, 1913, after having devoted twenty-eight years of his life to the reorganiza-

tion and building up of the old Society, and the contrast between its almost defunct and bankrupt condition when he took office and the wonderful degree of its prosperity to-day will indicate the immeasurable debt which the whole Society and British Horticulture—nay, the Horticulture of the whole world—owes to Sir TREVOR LAWRENCE. As to his own share in the work he was characteristically and unduly modest, always insisting strenuously on the view that the prosperity of the Society was not the work of any one man or set of men, but was mainly due to the widespread revival in all ranks of the inherent love of flowers.

As is well known, Sir TREVOR was a most charming and generous host. At the time of the third International Conference on Genetics he spared no pains to make the gathering a conspicuous success, personally superintending all the details of the Conference, even down to the selection of the wines and of the menu for the banquet given by the Society to the international guests. In addition to this he and Lady LAWRENCE invited all the members of the Conference to a most delightful luncheon and garden party at Burford, the recollection of which can never fade from the memory of those who were so fortunate as to be present. A similar magnificent luncheon they gave on the occasion of the 1912 International Horticultural Exhibition, when all the foreign horticulturists and many of the British were entertained at Burford, and carried away with them to all quarters of the globe a report of the beauty of the gardens and of the profuse liberality and generosity of the President of the Royal Horticultural Society of Great Britain.

Sir TREVOR always conducted KING EDWARD and QUEEN ALEXANDRA round the Temple Shows, few of which their Majesties failed to attend—a gracious practice which has been followed by KING GEORGE and QUEEN MARY. Sir TREVOR was also associated with KING GEORGE at St. Bartholomew's Hospital and with the administration of the King's Fund, and after his death Lady LAWRENCE received a most kind personal message of sympathy from His Majesty.

In his capacity as President of the Society, Sir TREVOR took more than his full share of work and responsibility. The Fellows recognized in him the ideal President, and his chairmanship was always marked with perfect tact. It is a striking testimony to his powers that since the reorganization in 1887 there has been only one serious dissension in the Council, and perhaps the story of this occurrence shows his tact and wisdom at their best. The disagreement arose on the question of the most fitting manner in which to celebrate the Centenary of the Society. It was agreed

by everyone that a New Hall was required, and by most that a new Garden was very desirable. But when it was ascertained that the cost of a Hall would be at least £50,000, the members of the Council entirely despaired of raising such a sum, and it was therefore decided to recommend to the Fellows a Garden as the celebration of the Centenary; and with this unpopular recommendation the Council came before a general meeting of the Fellows. The situation was saved by the President, who, in an excellent speech, explained to the Fellows that the sole reason for the Council's preferring the Garden scheme was the apparent impossibility of raising the money for a Hall, although it was plain that this would be by far the most useful memorial. The speech was entirely successful. Three Fellows rose, one after the other, and offered £1,000 each if the Council would adopt the scheme for a New Hall; and Baron SCHRÖDER, who was sitting next to the President, whispered that he would give £5,000. Sir TREVOR himself added £500 and the EARL OF ILCHESTER £300. Thus in the space of a few minutes the promise of nearly £10,000 was obtained, and the President announced that, after so practical a demonstration of the views of the Fellows, he, on behalf of the Council, reversed the policy which had been placed before the meeting, and decided that the Centenary of the Society should be celebrated by the erection of a Hall. He added that the Garden, greatly as it was needed, must wait for the present.

Sir TREVOR'S bold and wise action in executing this striking change of policy in the name of the Council, without waiting to consult his colleagues, was resented by some of the members, and three of them resigned in consequence. The President, however, did not act without thought. Recognizing that delay in this emergency would be fraught with danger, "he grasped the skirts of happy chance" and, soldier fashion, took the risks of receiving "the blows of circumstance."

Such is the history of the one and only disagreement in the Council during the whole period of Sir TREVOR'S presidency since 1887; and, much as he regretted the loss of his three colleagues, he felt that he did right to reverse the previous decision of the Council, since it had been made on insufficient grounds. No *coup d'état* recorded in history has more absolutely justified itself by its results. Not only did the Society thereby become possessed of the magnificent Hall and offices in Vincent Square, but the proceedings at this memorable meeting bore consequences of an important nature in the subsequent gift to the Society by Sir THOMAS HANBURY of the garden at Wisley.

All those who have served on the Council of the Society can

testify to the perfect courtesy and urbanity—tempered, when need be, with firmness—with which Sir TREVOR always presided. The Secretary and all the staff, both in London and at Wisley, received from the President unvarying kindness and consideration, and all who worked with him had at all times absolute confidence in his judgment and determination.

In February 1906, when Sir TREVOR had completed an unbroken tenure of twenty-one years as President of the Society, it was resolved at the Annual Meeting to invite the Fellows to subscribe towards having his portrait painted by Sir HUBERT HERKOMER, R.A., to place in the Council Room, and to establish in perpetuity a gold medal, to be called "The Lawrence Medal." A response of over one thousand guineas was the result. The portrait was painted and now hangs at Vincent Square ; and a medal was designed by Mr. BERTRAM MACKENNAL, A.R.A., which ranks as the premier medal of the Society, only one being awarded each year, the first medal struck being rightly given to Sir TREVOR; and only as late as last November a Veitch Memorial medal, specially struck in gold, was presented to him by the Trustees in recognition of his services to horticulture during the long term of his Presidency of the Society.

Sir TREVOR LAWRENCE, K.C.V.O., V.M.H., and a Knight of Grace of the Order of St. John of Jerusalem, was born at Whitehall Place, London, on December 30, 1831, and was thus within a few days of his eighty-second birthday when he died at Burford, near Dorking, on December 22, 1913. He was the only son of Sir WILLIAM LAWRENCE, Baronet, Serjeant-Surgeon to QUEEN VICTORIA, a pupil of the famous Dr. ABERNETHY, a Fellow of the Royal Society, and a Corresponding Member of the Institute of France. His mother, from whom he inherited his intense love of plants, was a Miss SENIOR of Broughton House, Buckinghamshire. Educated at Winchester, he subsequently studied medicine at St. Bartholomew's Hospital, and in 1854 went out to India, and for ten years served there on the Army Medical Staff during the period of the Mutiny. He succeeded to the baronetcy in 1867, and in 1869 married ELIZABETH, the only child of Mr. JOHN MATTHEW, of Burford, by whom he had three sons and one daughter. In 1874 he unsuccessfully contested the city of Gloucester, his family being an old Gloucestershire one ; but in 1875 was elected one of the Members of Parliament for Mid-Surrey, which he continued to represent (after it was changed to the Reigate Division) without interruption until he retired in 1892, when he

accepted the office of Treasurer (*i.e.* principal administrative officer) of St. Bartholomew's Hospital, which he found in a troublous financial condition not altogether unlike that from which he had successfully rescued the Royal Horticultural Society. Few people know how much the difficulties which he experienced in dealing with the hospital weighed upon him, but, notwithstanding it all, he initiated a vast amount of good work, rebuilding the pathological block and the out-patients' department, securing to the staff a voice in the general management, and making the hospital the direct landlord of its own property by abolishing the middleman, a policy which the *Times* says "proved financially sound as well as being of the greatest advantage to the tenants." During his tenure of the office of Treasurer he gave £100 annually to establish a Research Studentship, and, with his sisters, founded a Lawrence Medal for a similar purpose in memory of his father. He was an Alderman of the Surrey County Council, and also from the first a Member of King Edward's Hospital Fund, acting as Vice-Chairman of the Distribution Committee.

Sir TREVOR had one of the finest collections of Japanese lacquer in this country, especially lacquer of the eighteenth and first half of the nineteenth century, and printed a finely-illustrated catalogue of this for private circulation in 1895. The most remarkable piece is probably the seventeenth-century robe chest, from the Hamilton Palace sale, similar to, but larger than, the chest purchased at the same sale now in the Victoria and Albert Museum. He was a vice-president of the Japan Society. He also had a fine collection of Chinese and European porcelain, including a valuable and representative collection of early Worcester.

He was, says the *Times*, a generous and broad-minded but "unostentatious supporter of charities, a popular and delightful host, and a singularly handsome man, who seemed till he reached four-score years to have learnt the secret of perpetual youth and health. He was on terms of close friendship with leaders in science, literature, and other walks, such as LISTER, KELVIN, PAGET, VIRCHOW, PASTEUR, BROWNING, MEREDITH, HERBERT SPENCER, RUSSELL LOWELL, LECKY, and WOLSELEY."

Burford being situated in the parish of Mickleham, the funeral took place there on Saturday, December 27, at 2.30 P.M., a Memorial Service being held at the same time at Holy Trinity Church, Kensington. Both services were very largely attended, the Royal Horticultural Society being represented by the following members of the Council, viz.:—Sir GEORGE HOLFORD, K.C.V.O., C.I.E., Baron BRUNO VON SCHRÖDER, Sir DANIEL

Fig. 157.—Burford Lodge, the Residence of the late Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H. (from the North).

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Fig. 158.—Burford Lodge, Dorking (from the South).

Fig. 159.—Burford from the South-West.

Fig. 160.—Lily Pond on the Lawn at Burford.

FIG. 161.—CRINUM POWELLI AT BURFORD.

Fig. 162.—Mickleham Church, Surrey.

FIG. 163.—VEITCH MEMORIAL MEDAL.

FIG. 164.—THE VICTORIA MEDAL OF HONOUR IN HORTICULTURE.

FIG. 165.—THE LAWRENCE GOLD MEDAL.

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MORRIS, K.C.M.G., Sir ALBERT ROLLIT, Sir HARRY J. VEITCH, Mr. A. W. SUTTON, Mr. W. A. BILNEY, Mr. E. A. BOWLES, Mr. HENRY B. MAY, and the Rev. W. WILKS, the Secretary during the last twenty-five years of Sir TREVOR'S presidency. Other prominent Fellows of the Society present were: Sir JEREMIAH COLMAN, Bart., Sir DAVID PRAIN, F.R.S., Sir ARTHUR CHURCH, Mr. WILLIAM BATESON, F.R.S., Mr. F. J. CHITTENDEN, Mr. D. W. THOMSON, Mr. THOMAS MCROW, Mr. R. HOOPER PEARSON, Mr. W. BAIN, and Mr. W. H. WHITE. The new President, the Right Hon. Lord GRENFELL, Field Marshal, was unfortunately laid up with influenza and forbidden to attend.

Sir TREVOR is succeeded in the baronetcy by his eldest son, Sir WILLIAM MATTHEW TREVOR LAWRENCE, who has one son and two daughters. Sir WILLIAM was born in 1870, and educated at Shrewsbury, New College, Oxford, and Heidelberg and Berlin Universities, and is an Examiner in the Board of Education.

The writer of this very imperfect memoir cannot but feel that he has lost one of the kindest of friends and one of the wisest of counsellors.

W. W.

THE FOLLOWING IS AN EXTRACT FROM THE MINUTE BOOK OF THE SOCIETY'S ANNUAL MEETING, FEBRUARY 10, 1914.

The Fellows of the ROYAL HORTICULTURAL SOCIETY in Annual Meeting assembled this 10th day of February 1914 desire to express their great regret at the death of their late President, Sir TREVOR LAWRENCE, Baronet, K.C.V.O., V.M.H., &c.

They wish also to put on record their profound appreciation

(1) Of the most eminent services rendered by Sir TREVOR to the Society during the very difficult days which beset the commencement of his Presidency in 1885 and the years that followed; and also

(2) Of the patience which he showed during the gradual building up again of the Society during the middle period of his office; and, lastly,

(3) Of the tact and wisdom with which he directed the

> Society's affairs during the later years of its prosperity—a prosperity due in no small degree to the personality of its President.

It was Proposed by Sir HARRY VEITCH, V.M.H., and Seconded by J. GURNEY FOWLER, Esq., Treasurer, and carried in silence, all upstanding, "That the above Resolution be entered in the Minute Book of the Society, published in the *Journal* and communicated to Lady LAWRENCE and to Sir WILLIAM LAWRENCE, together with the Address which had been prepared by the Council for presentation to Sir TREVOR, but was delayed by his illness and death."

THE COOKING OF VEGETABLES.*

By C. Herman Senn, F.C.A., F.R.H.S., &c.

[Read September 9, 1913; Mr. J. Hudson, V.M.H., in the Chair.]

It has been stated more than once that there are vast numbers of English people (though I should naturally not include the Fellows of the Royal Horticultural Society among them) whose knowledge of the vegetable kingdom is chiefly confined to potatos and greens, and to only one method of serving even these.

So far as the typical English cuisine is concerned, it cannot be said that the average English cook displays the same acquaintance with the many ways known of serving those delicious and appetizing vegetables as does the Continental cook, who prepares them with so much skill and delicacy. We are far too conservative in our ideas of vegetable cookery in this country, and the sooner we can induce our family cooks to be more liberal-minded in this matter, the sooner a greater variety of vegetables and better ways of cooking them will be attained. It is a matter of regret that both the preparation and cooking of vegetables is so often left to incompetent servants.

Stem Vegetables.—Some of you may remember that last year when I had the pleasure of speaking to you, I divided the subject chosen into four divisions, namely:— Root and Tuber, Stem, Leaf, and Fruit Vegetables. On that occasion I discussed the cooking of Roots and Tubers, and I promised to deal with Stem Vegetables this year.

Practically the whole of the edible stems of vegetable plants prove, when properly cooked, very delicate eating, especially when first blanched, as with celery or chicory. Slow cooking, viz. steaming or stewing, is essential in order to preserve and develop the flavour.

Asparagus is probably the best known example of a delicate edible stem. There are many kinds, the white, the green, and the violet. The violet is the most expensive because of its size and flavour, but the green asparagus has decidedly more pronounced taste. Asparagus grown in this country is usually of excellent quality and decidedly better in flavour than most of that grown on the Continent. The only pity is that its season is so very short. On the other hand, asparagus not of our own production, but of our skilful neighbours across the Channel, is obtained practically at all seasons. "Paris Green," the name given to a favourite variety of choice French forced asparagus, can be had throughout the year, but it is nearly always expensive even at times when there is a glut of other varieties.

The finest French asparagus is the famous "Argenteuil," a large pink variety, which is grown in the proximity of Paris, from whence also comes what is known in the trade as "Giant Asparagus"; these varieties

* See also Journal R.H.S., vol. 38, p. 540.

require longer and more careful cooking than is the case with the ordinary smaller varieties of asparagus.

Yet another variety is "Sprue," which is too thin to be served as asparagus proper. Sprue, when cleaned, and cut into small pieces or points, forms a useful vegetable by itself, as a garniture for soups, entrées, &c., or as a filling for bouchées, omelets, &c.

Asparagus contains a substance known as *asparagin*, which causes this vegetable to possess aperient and diuretic properties.

Fresh asparagus has the colour of the points violaceous, gradually shading to green. Asparagus tips, which are generally cut from what is known as "green grass" ("grass" is the trade abbreviation of the word "asparagus"), are a favourite garnish in high-class cookery for entrées, &c., and are also largely used cold in salads, &c.

The orthodox, and no doubt the most popular, method of cooking asparagus is that of boiling in salted water, and serving with melted or oiled butter. The latter is well enough once or twice, but why the English cooks almost always make it a practice to serve "beurre fondu" with asparagus when there are several excellent sauces which are easily made, are far less costly, and form an excellent accompaniment, it is difficult to understand.

The ideal way of serving this delicious vegetable is with Hollandaise Sauce or Mousseline Sauce, or else with Vinaigrette. The last is particularly good with cold asparagus. Mayonnaise sauce mixed with a little whipped cream is also excellent served with cold asparagus.

Asparagus Ice.—The latest novelty, made from asparagus purée, cream and sugar, is a dainty ice soufflé. A little sherry is added, which is said to improve the flavour of this novel sweet to a remarkable degree.

Celery.—There is hardly any other vegetable of which every part can be brought to such good account as celery. The trimmings can be used for flavouring purposes, or for soups and broths, whilst the ends are carefully preserved for similar uses, or to produce celery seed, which in itself forms an ideal table condiment. Celery soup, celery cream, celery sauce, and ordinary celery salad are amongst the more common styles of preparing this vegetable, and there are dozens of other ways of cooking and serving it, for celery is largely eaten raw also. Celery possesses remarkable medicinal value, and is said to cure nervousness.

Seakale is another example of the edible stem, very delicately flavoured. It is said to possess the flavour of the cauliflower as well as of asparagus. Forced seakale is excellent in midwinter.

The *leek* is akin to the onion, but much milder in flavour. Unlike the onion, only the blanched leaf stalks are used. Besides being the national emblem of the Welsh, it is also grown in large quantities throughout Great Britain, and in Scotland it forms, in connexion with a kind of delicious broth—the popular and tasty dish known as "cock-a-leekie." Leeks can be prepared and cooked in a variety of styles—boiled, stewed, braised, fried, and baked. They make a most acceptable winter vegetable, as well as an excellent soup.

Besides these well-known vegetables there remain other edible stems, cultivated within more recent years, which only require testing to prove themselves widely popular.

Chicory, for instance, is now frequently to be seen in English markets. It should commend itself to economical housewives, for practically every part of it is fit for food. Both in this country and on the Continent, the young root is cooked and served as a vegetable, whilst the leaves are served as a salad like those of endive. The roots of chicory, as most of us know, are also roasted and ground and mixed with coffee.

Seakale beet, another edible leaf stalk, is a variety of beet with wide midribs to the leaves, and these alone are eaten. The *Couve Tronchuda*, or *Portugal cabbage*, also belongs to this division. It is a Gargantuan specimen of the cabbage tribe, but the leaves are rejected, being too coarsely flavoured for human consumption. The thick midrib is the only edible portion, and this, like many other kinds of vegetables, is much improved in the eating by serving it with white sauce. The Couve Tronchuda is specially hardy and prolific, and so forms an excellent winter vegetable.

Cardoons are closely allied to artichokes and belong to the same family. The vegetable can be cooked in the same way as celery, but cardoons are very much larger plants both in height and circumference. For this reason they cannot be served in large pieces as is the case with celery, but must be cut up in slices. A popular method of serving cardoons is to simmer the pieces till tender, first in water and then in a little rich stock or gravy, and then serve with cream sauce. Another good way is to first steam and then lightly fry the slices in butter. Parboiled and braised cardoons, garnished with slices of beef-marrow, are considered a great luxury.

A FEW RECIPES FOR LEEK, ASPARAGUS, AND CELERY DISHES.

Braised Leeks.

Take the white part of a bunch of young leeks, and pull off the outside leaves. Wash and drain well. Put them in a stew or braise-pan with a pint of good stock, 1 oz. of butter, two small braised onions stuck with two cloves, and a bouquet garni, and when cooked drain, dish up on a slice of toasted bread, then pour over a white or brown sauce, according to taste, and serve.

Leeks au Gratin.

Wash, trim, and cook the leeks in salted water or stock, then drain them. Butter a gratin dish, put in the leeks, covering each layer with white or brown sauce, and season to taste. Coat the top layer with sauce, besprinkle with grated cheese and breadcrumbs, and put a few tiny pieces of butter on top. Then bake in the oven till the top is nicely browned.

Leeks à la Vinaigrette.

Young leeks boiled or braised, as directed for braised leeks, can also be eaten the same way as asparagus, with some Vinaigrette or Mayonnaise sauce.

Leeks à la Ravigote.

Take six young leeks and cut away the root and leaves. Cut in two, lengthways, and put them into a stewpan. Cover with slices of bacon, moisten with white stock, and add a sprig of parsley. When they are boiled drain away the liquor, and allow them to cool. Serve in a vegetable dish covered with the following sauce :—Mix in a small bowl a teaspoonful of mustard and two of tarragon vinegar. Add gradually some oil, and finally two chopped shallots, salt and pepper, and chopped parsley.

Asparagus with Peas.

Take a bundle of small green asparagus, bud, scrape, and wash well. With the right hand hold the thick end of the stalk, and bend quickly in making it slip between the thumb and the first finger of the left hand until it breaks. Then place the stalks in a line on the table and cut in small pieces, cook in salted water, drain in a colander, and plunge into cold water, to keep them a nice green colour. Cook the asparagus points separately because they require less cooking. Put a piece of butter in a sauté-pan, and when melted put in the stalks and the points, season with salt, pepper, and a pinch of sugar. Finally, mix the asparagus with a tablespoonful of white sauce and serve in a vegetable dish. Garnish round with fried bread croûtons or fleurons of puff paste. Be careful not to overcook the asparagus, otherwise it becomes a purée.

Asparagus Points à la Royale.

Choose large asparagus, cut it about one inch from the point. The stalks with the points off may be used for asparagus cream soup. Wash the heads, cook in salted water, drain, and put in cold water. Heat up two tablespoonfuls of Allemande sauce, thicken, and add the asparagus points, also some truffle cut in fine shreds. Serve in a vegetable dish, decorate with puff pastry fleurons, or put the mixture into a vol-au-vent crust, and place on a hot dish to serve.

Asparagus Omelet.

Cut into inch or half-inch lengths the soft portion of twenty-five to thirty heads of cleaned asparagus ; blanch them and cook in salted water till tender. When done, drain them on a sieve, then toss them in a little butter, add a little stock or white sauce, season with pepper, and keep hot. Heat up five or six eggs, add a tablespoonful of milk or cream, salt and pepper to taste, and pour into an omelet pan containing about an ounce of butter (melted). Stir over the fire till the eggs begin to set ; shape to an oval cushion, placing the prepared asparagus in the centre, fold in the ends of the omelet, let it take colour, and turn out carefully on to a hot dish.

Asparagus Salad.

Proceed as directed in the preceding recipe, and when the points have been cooked and drained put them in a basin with a little oil and vinegar, salt and pepper, and chopped tarragon ; mix lightly. Serve with a border of hard-boiled eggs cut into quarters. Asparagus points thus prepared can be used as a garnish for cold entrées, such as suprême de volaille, côtelettes d'agneau en belle vue, &c., &c.

Asparagus Salad with Cauliflower.

Cut the tender part of some cooked asparagus into 1½-inch to 2-inch pieces. When cold, mix with sufficient tartare or rémoulade sauce to well season the salad. Plain Mayonnaise or ordinary salad dressing, oil, vinegar, &c., may be used instead of the above-named sauces. The mixing must be done very carefully, so as not to mash up the asparagus pieces. Dress the salad in a glass dish or flat bowl ; garnish with small pieces (flowerets) of cooked cauliflower, so as to form a pretty border ; sprinkle with finely-chopped parsley, and serve.

Asparagus Salad with Shrimps.

Cook the asparagus points in salted water as before directed, drain them, place them in a basin with half the quantity of shrimp purée. Mix the other half with some Mayonnaise sauce, and carefully mix with the asparagus. Serve in a salad bowl or on a shallow dish, and decorate with quarters of hard-boiled eggs and sprigs of parsley.

Asparagus Points with Scrambled Eggs.

Cook and drain the asparagus points as directed in the foregoing recipe. Break six eggs in a saucepan, season with salt, pepper, and a pinch of grated nutmeg. Add an ounce of butter and two tablespoonfuls of cream, and mix carefully. Put on the fire and stir constantly until it thickens. Draw the saucepan off the fire, add to the scrambled eggs a tablespoonful of white sauce. Mix in lightly the asparagus points. Serve on a hot dish and garnish with fried bread croûtons.

Celery Soup.

One head of celery, one large potato, 2 oz. butter, 1 pint vegetable stock, salt, 1 gill of milk or cream.

Wash and scrub the celery, cut away all unsound parts, and cut the celery into small pieces. Peel and cut the potato small. Melt the butter in a saucepan, put in the vegetables, and stir a few minutes over the fire until the celery begins to cook, then put on the lid and place the saucepan over a very gentle heat for about ten minutes, stirring occasionally. Add the stock, and boil until the celery is tender. Then rub all through a hair sieve. Warm up the soup, add the milk or cream, and season.

Leeks may be substituted for celery and make an agreeable, wholesome soup. About three, or possibly four, leeks would be required for this quantity.

Celery Cheese.

Arrange two or three heads of cooked celery, stewed or braised, cut into 3-inch lengths, on a well-buttered baking-dish; season with salt, pepper, and nutmeg, pour over some Béchamel or other good white sauce. Sprinkle over plentifully with Parmesan and Cheddar cheese (half and half). Bake in a brisk oven till the top is nicely browned.

Curried Celery Fritters.

Two sticks of white celery, ½ pint of thick Béchamel or other good white sauce, one dessertspoonful mulligatawny or curry paste, frying batter, fine salt, one teaspoonful curry powder, vegetable stock, palmine fat for frying.

Wash and clean the celery, cut it into 2-inch pieces, and cook till tender in stock or salted water. Drain the pieces on a sieve. When cold, toss them in the white sauce, previously mixed with the curry paste. The pieces must be thoroughly coated with sauce. Dip each piece of celery into frying batter, drop into hot fat, and fry to a golden colour. Drain on a cloth or paper, sprinkle with fine salt mixed with a little curry powder (just enough to colour it), dish up on a folded napkin, and send to table immediately.

NOTE.—Asparagus, cucumber, or marrow may be cooked in the same manner.

Celery Croquettes.

Trim, wash, and cut into small pieces two heads of celery, blanch them in salted water, and drain, then cook till tender in well-seasoned stock. Drain the cooked celery, and chop it rather finely. Melt an ounce of butter in a stewpan, and stir in an ounce of flour; blend these together, and a chopped shallot, and fry a little, then gradually add a gill of milk; stir till it boils, and put in the chopped celery. Season with salt and pepper, and cook for about ten minutes, adding at the last two yolks of eggs. Spread the mixture on a dish and let it get cold. Make up into croquettes (cork or ball shapes), egg and crumb them, and fry in hot fat to a golden colour. Drain them on a cloth or paper, and dish up. Garnish with sprigs of parsley, and serve hot.

Celery Fritters.

Wash and trim two heads of celery, and cut it into 3-inch pieces, then boil in salted water till tender. Drain off the water, dry in a cloth, and season with salt, pepper, and a little chopped parsley. Dip each piece of celery into frying batter, and cook in deep fat to a golden brown. Drain carefully, dish up, and serve.

Celery as Hors-d'œuvre.

Cut into very fine strips, about ½ inch long, the centre (white) portion of two heads of celery. Mix a tablespoonful of anchovy paste with the yolks of two hard-boiled eggs, three tablespoonfuls of

oil, and one of vinegar. Shred finely the hard-boiled white of two eggs. Mix these with the celery, and arrange in small glass dishes on hors-d'œuvre dish, pour over the prepared dressing, season to taste, and besprinkle with chopped parsley.

Savoury Celery and Macaroni.

Take three heads of celery, milk and water, bay-leaf, 2 oz. macaroni, ½ pint white sauce, white pepper, nutmeg, salt.

Trim and wash the celery, boil it till tender in the milk and water, seasoned with salt and a bay-leaf. Drain the celery, and cut into 2-inch lengths. Cook likewise the macaroni in salted water, and when done drain on a sieve and cut into short pieces. Heat up the white sauce, put in the celery and macaroni, season to taste with pepper and a grate of nutmeg, and let the whole simmer gently for about fifteen minutes or longer. Care must be taken so as not to mash up the celery or macaroni. Dish up on a hot dish, and serve.

TWO VEGETABLE SAUCES.

Hollandaise or Dutch Sauce.

Two tablespoonfuls vinegar, one shallot, peeled and chopped, 1 gill white sauce, one teaspoonful lemon juice, 2 oz. butter, one bay-leaf, four white peppercorns crushed, two yolks of eggs, salt.

Put the vinegar (French wine vinegar in preference to malt vinegar) with the shallot, bay-leaf, and peppercorns in a stewpan, and reduce to half its original quantity ; add the white sauce, let it boil ; remove the bay-leaf and stir in the yolks of eggs when it begins to thicken. Remove from the fire and strain into another stewpan. Reheat—taking great care that the sauce does not curdle—and whisk in the butter by degrees ; lastly, add the lemon juice and enough salt to taste.

Mousseline Sauce.

Half-gill cream, three crushed peppercorns, salt and pepper, four yolks of eggs, 1 oz. of butter, lemon juice.

Put the cream, egg yolks, and the pepper in a stewpan, place this in a bain-marie half filled with boiling water, beat up with a whisk for a little time ; then add, one at a time, little pieces of butter, stir all the time, but do not add any more butter until each piece has been thoroughly worked in and is absorbed in the sauce. The sauce, when finished, will have the appearance of a frothy cream, and should then be passed through a tammy-cloth. Just before using finish off with a few drops of lemon juice ; a pinch of salt and a grate of nutmeg should be added during the process of whisking. This sauce is excellent served with asparagus, artichokes, seakale, cauliflower, &c.

AUTUMN BORDER FLOWERS.

By Bernard Crisp, F.R.H.S.

[Read September 23, 1913; Mr. A. W. Hill, M.A., in the Chair.]

Before I discuss the question of autumn border plants, I should like to claim a kind of poetical licence as regards the exact time that these plants are expected to be in bloom. I do not wish to get too close to what the calendar calls autumn, but I think that when one first hears the cry of the Lavender-seller in the streets of London one can come to the conclusion that the summer is on the wane, and that the time of autumn border plants is at hand.

To have a grand effect with herbaceous plants, there is no better way of planting to show their best form of growth and colour than the long double border with, if possible, a grass path between, and it is this grass path that gives a great additional charm, as not only does it make a splendid groundwork for the plants, but it is always soft to the eye and comes as a relief on a hot summer day from the hard sun-baked gravel generally considered the only material for garden walks.

Of course, if a lot of wheeling has to be done on this path one must revert to the gravel; but if it is only a path by which the border may be viewed, by all means have it of grass.

To have small beds of herbaceous plants is, as a rule, unsatisfactory; it is difficult to cover up the plants that are past their best and a proper plan of colour is impossible. Though for a time you may get a blaze of colour, it is not always pleasing to the eye, and might better be described as a "vulgar riot" of colour.

For instance, if you have the strong colours in a bed on a wide lawn, it always looks harsh; you cannot lead up to the strong colours. If, on the other hand, you have the soft colours there, it often looks insipid.

To have the same border always bright, let alone a blaze of colour, from April to October is impossible, and the only way to get continuous bloom in the garden is to have separate borders for different seasons of the year.

It will, however, be found that the early and late borders are in bloom for a shorter period of time than the main summer one; and it is this reason that induces me to select the last as the one that will probably suit the majority of people's requirements. The early bedding plants and bulbs, with the help of a small border for May and June, will probably give as much bloom elsewhere early in the year as is required of the moderate-sized garden; and I think it much

better not to destroy the beauty of the summer border by trying to get it in partial bloom spring, summer, and autumn.

When one is shown round a friend's garden, one is so often told, "You should have been here a fortnight ago," or else "in a month's time." It is a curious fact, never mind what time of year one is in that garden, there is always some excuse; the reason is that too much has been attempted. The border may look fairly well in May and June; it has a hard struggle in July, and in August it throws up the sponge and decides not to try any more.

To have a grand effect in the border one must take particular care to have the ground thoroughly trenched; if this is done properly at first, a border will last several years, though it will, of course, require a top-dressing every year, and the dividing and replanting of most of the strong perennials. It is extraordinary how plants that have been split up each year will withstand a drought, whereas those that have been left in position for several years and grown into hard clumps show very early in any drought that they are in trouble.

The planting is one of those things that cannot be done in haphazard style, and before it is begun it is far better to work out a proper plan than simply to put in the plants regardless of time of flowering or colour; and, what is still more important, to choose those plants that will hide others whose period of bloom is over.

Do not make the mistake of getting the plants in regular rising heights from the path to the back of the border. Allow some of the taller plants to come boldly to the front, and get some of the dwarf ones to recede into the border and form small bays of colour, which are always pleasing, bearing also in mind that it is more effective to plant in long irregular clumps than in the ordinary round clump generally seen.

The constant repetition of the same kind of plant should be avoided as much as possible. One generally has a particular favourite, and one likes more than one clump of it; but, as a general rule, plant a good patch and have done with it.

Plant thickly; no ground should be visible when the border-season is on; there is again the double advantage in that it looks better and saves weeding, as in a thickly-planted border the weeds have but a poor chance. Now with the summer border (by which I mean that one that starts with the Delphiniums and is ended by the frost destroying the Dahlias), its plan of colouring is gradually unfolded from the beginning of July, and from the middle of that month to mid-September it is a blaze of colour, and in ordinary seasons is still looking bright well into October. It must be our aim not to make the mistake of colouring as in the small beds before mentioned, but by starting as you enter the border at either end with flowers of light colouring and foliage plants of grey-glaucous or bluish leaf. As one passes towards the centre the colour is allowed to become stronger and stronger, till in the centre position you get one strong colour vying with another. There is all the difference in its effect now, as the eye has been gradually educated up to it, and with a little selection it will be found the colours do not clash.

Only in the middle portion of the border should this riot of colour be allowed, for there only does it look really in place.

I have heard a good deal of various forms of colour schemes, one in particular which represents a border beginning, say, with 10 feet of white, 10 feet of blue, 10 feet of red, and so on, with various colours all down the border. I do not think this can represent an effective colour scheme. To my mind it rather gives one the idea of a patch-work quilt than anything else.

As regards the staking, the best thing I know of is pea sticks, with the small branches left or only trimmed to shape—stakes that have not been cut too long, so that they will bend, and not break easily.

It is well, before an attempt is made to stake the border, to have bundles of these sticks cut in different lengths, pointed, and distributed according to the length required to each clump ; now follow on, put in the sticks firmly, tie round with tarred twine, and shorten back the sticks to the flowering height of the plants.

If the gardener has a real knowledge of the plants, this can in most seasons be judged to a nicety. If carefully done, and at exactly the right time, within a fortnight very little of the sticks will be showing, and by the time the border is in bloom not one will be visible. It has this advantage over the staking of the plants when they have arrived at the flowering stage, that the habit of growth is unaltered, whereas to attempt to tie up when in bloom very often gives the impression of tying up a sheaf of corn.

The large family of *Phlox decussata* one might describe as opening the season of autumn-flowering plants, and there is no other family that gives such a tone to the border. Perhaps a few of the best varieties are the following :—

'Frau Ant. Buchner' . .	pure white.
'La Fiancée' . . .	pure white.
'Adonis'	soft pink.
'Elizabeth Campbell' . .	soft pink.
'Pantheon'	deep pink.
'Rijnstroom' . . .	rich salmon
'Gen. Van Heutsz' . .	cerise.
'Selma'	pale pink with carmine centre.
'Iris'	violet.
'Le Mahdi'	deep violet.
'Africa'	carmine-purple.

The Dahlia is another of these plants that has had a wide popularity, but though, perhaps, tending to yield its place to more pleasing subjects, has lately taken a renewed lease of life through what are known as the Pæony-flowered varieties. The softer and self-coloured ones are charming, though I cannot admire the more gaudy ones.

Another plant that deserves a place in my esteem is *Romneya Coulteri* (the Californian Poppy), apparently found very difficult to grow. I

must say I have never discovered this difficulty. It requires a sunny position in deep, light soil, its roots often going down to a depth of 4 feet, and throwing up its long glaucous-green foliage to a height of 6 feet with a profusion of pure white flowers with yellow stamens.

The yellow of *Anthemis tinctoria* 'E. C. Buxton,' *Anthemis Kelwayi*, with the various Heleniums, such as *pumilum magnificum*, *cupreum*, 'Riverton Gem,' 'Riverton Beauty,' the large family of *Helianthus* and the red flowers of *Polygonum amplexicaule*, *Polygonum amplexicaule atrosanguineum*, the deep blue of *Echinops Ritro*, the small white flowers of *Gypsophila paniculata*, with the various-coloured double Hollyhocks, help to give the border that charming effect we desire.

Primula capitata, with its flat heads of deep-blue flowers on stalks often a foot or so in height, should be planted in a moist, shady position in the border. The seedlings from the early spring sowing give a good display of bloom in September. It is of the easiest cultivation, and well repays the slight attention required.

It is, perhaps, curious that *Zauschneria mexicana* is not more often grown. The best results can only be obtained by growing it in poor soil facing south. In this position it will be a mass of scarlet flowers for two months. The same treatment is required for the deep-blue *Plumbago Larpentae* (syn. *Ceratostigma plumbaginoides*), first found, I believe, on the walls of Pekin.

For semi-shade *Senecio Clivorum*, with its golden-yellow flowers, makes a good border plant, and, provided the position is not too dry, does not require the help of the bog garden.

The blooming period of the border is carried on with the help of such plants as *Sedum spectabile*, *Sedum spectabile atropurpureum*, Pentstemon, early Chrysanthemums, *Anemone japonica*, and the many beautiful varieties of Michaelmas Daisy. It is perhaps a pity that the Pentstemon is being spoilt. By too much attention being given to producing flowers of large size the grace and elegance of the plant are destroyed. Nothing could be more beautiful than the glorious red of Pentstemon 'Southgate Gem' and the soft pink of Pentstemon 'Middleton Gem,' both moderate-sized flowers.

The graceful *Anemone japonica*, *Anemone japonica alba*, with the newer varieties, such as 'Alice,' 'Géant des Blanches,' and *rosea superba*, should not be forgotten; they bloom profusely, but should be left undisturbed for several years.

One of the finest and largest families of autumn border plants is the Michaelmas Daisy. The varieties introduced are so numerous that careful selection is required. Useful as they are for the mixed border, they are best grown in a border by themselves, where this is possible. Until they are in bloom they have of course a dull appearance, but this can be obviated to a great extent by placing in front a row of silver and glaucous-leaved plants, which has the effect of throwing the border up in strong relief. The plants best suited for this front row are many of the silvery Artemisias &c., such as *Artemisia discolor*, *A. frigida*, *A. Palmeri*, *A. Roezlii*, *A. sericea*, *A. Stelleriana*, *A. tridentata*, with the

silvery foliage of *Santolina incana*, the grey foliage of *Stachys lanata*, the long glaucous leaves of *Elymus glaucus* and *Nepeta Mussini* with its lavender-blue flowers, which, if cut back in early June, will bloom well into September.

In a border such as this it is better not to use the very early or very late Asters, but to keep to those that will be at their best from the middle of September to the middle of October. Include the light and deep purple and pink of the *Amellus* varieties, the white, lilac, and lavender of the small feathery-flowered *cordifolius* family, the small many-coloured flowers of the Heath-like *ericoides* section, the tall varieties of *A. novae-angliae*, the numerous (perhaps too numerous) varieties of *A. novi-belgii*, included in which are the semi-double 'Beauty of Colwall,' the perfect form of 'Feltham Blue,' and the soft pink of 'St. Egwyn.' If properly planted and staked, when viewed from either end a sea of bloom is visible, enabling us, in the dull winter months to come, to look back with satisfaction on the closing scene of autumn flowers.

DIFFICULTIES IN FLOWER SHOW SCHEDULES.

An Addendum to the Paper read by the Secretary at the Annual Conference of Affiliated Societies held in 1911.

By Rev. W. Wilks.

[Read September 26, 1913.]

In 1911 I read a paper before this Conference on "Difficulties in Flower Show Schedules," pointing out errors of frequent occurrence and their remedy.* That this paper met a need and has been of some assistance to Horticultural Societies is, I think, proved by the fact that whereas formerly I used always to have a very heavy correspondence, during the months of July and August especially, relating to disputes on points of disagreement in schedules, I now receive such letters comparatively rarely. During the last two years I have collected a few further errors which have occurred and to which I think it worth while to call the attention of other Societies.

1. *A dish of fruit—four varieties.*

An exhibitor staged two varieties of apples, one of tomatos, and one of pears.

It was contended that four varieties of *one kind* of fruit were meant, but the schedule did not say so. Any four varieties of fruit, either of the same or of different kinds, were probably eligible.

I say "probably," for it is doubtful whether such an exhibit should not be disqualified, as it would consist of four dishes of fruit, and the schedule only asks for "a" dish, *i.e.* one dish containing four varieties.

1*a*. Another example of the same error was as follows:—

Fruit—collection of six varieties, white and black grapes allowed.

An exhibit of one bunch each of black and white grapes, one dish of figs, one of peaches, one of nectarine 'Pine Apple,' and one of nectarine 'Humboldt' was disputed on the ground that only one nectarine variety was eligible. As a matter of fact, four or even six varieties of nectarines would not have disqualified the exhibit. Varieties were asked for. The schedule should have asked for six kinds. (See R.H.S. Code of Rules for Judging, § 2.)

2. *Six stems of different varieties of Sweet Peas.*

The exhibitors were, one and all, staging one stem each of six varieties. To do so was quite within the wording of the schedule;

* See Journal R.H.S. xxxvii. (1912), p. 497.

or they might have staged six stems of each of an unlimited number of different varieties, without disqualification. What the Show Committee really intended to ask for was "six vases of different varieties of Sweet Peas, six stems in a vase."

3. "*The best collection of Hardy Flowers. No duplicate bunches or mixed bunches allowed.*"

The question arose—Were *Phlox decussata*, vars. 'Tapis blanc,' 'Etna,' and 'Sheriff Ivory,' to be considered as "duplicate bunches"?

No, certainly not. The schedule did not specify one variety of each kind, and different varieties of one kind cannot be considered duplicates of each other.

4. "*Nine hardy and half hardy annuals—dissimilar.*"

A dispute arose because one exhibit contained two annual chrysanthemums of different colours.

The term "dissimilar" is one which should have no place in horticulture, and it is not recognized by the Royal Horticultural Society. To put the case thus: Two men are walking along the road—one wears a green hat and the other a brown. Are they similar or dissimilar? As men they are similar, and different hats cannot make them otherwise; but as specimens of colour or varieties of clothing they are dissimilar.

The word is a very bad one to use, and will give endless trouble in a schedule. "Distinct kinds" or "distinct varieties" restrict to narrow limits the latitude for misunderstanding.

5. *A class for Sweet Peas "shown with own foliage."*

It was contended that the foliage meant was that actually belonging to the individual plant from which the flowers themselves were gathered.

This is not the interpretation for Flower Show purposes. So long as the foliage is that of the Sweet Pea (*Lathyrus odoratus*), and not of any other *Lathyrus* or *Pisum*, the intention of the schedule is met.

Scented and Scentless Blooms.

It is well known that there has been a tendency in recent years for flowers of perfect form to be introduced into our gardens lacking the quality of scent. Such is our experience more particularly with regard to Roses and Sweet Peas.

To discourage such introductions is a work which Horticultural Societies might well undertake. The R.H.S. Floral Committee do not view with favour the scentless forms, and modify their awards to them accordingly. To encourage scented flowers, the following class has been adopted by one of the leading Societies in the West:—

"The best exhibit of flowers which are descended from ancestors which were noteworthy for the agreeable scent of their flowers as well as for their good form. The flowers shown to be, as flowers, improvements on their ancestral forms, whilst also and at the same time retaining closely the ancestral scent."

Definition of "A Cottager."

The term "cottager" means a person who (*a*) is, and for the six months preceding the exhibition has been, regularly engaged in manual labour for a wage, and (*b*) is not, and has not been, a professional gardener, and (*c*) has not received the assistance of paid labour of any kind in the cultivation of his ground or produce during twelve months preceding the exhibition, and (*d*) for the six months preceding the exhibition has resided in , and (*e*) whose cottage is not of a higher rateable value than pounds per annum.

The Groom Gardener.

The gardener groom or groom gardener is always a difficulty. They should be classed with amateurs if they like to exhibit as such, or as "gardeners," but never as cottagers.

It is impossible to make rules to suit everybody, and it is not, in my opinion, fair to let anybody show as a "cottager" who works in his employer's garden, and can consequently obtain seeds and plants therefrom, to say nothing of the temptation to show as his own what he has grown (or helped to grow) for his employer.

If once gardener grooms are let into the cottagers' division it will be found very detrimental to the real cottagers' showing, and it will also not be known where to stop until you find yourselves letting in the gardener who feeds the cow, or the pig, or gets out the coals.

Stove, and Greenhouse, and Hardy Plants.

In judging classes for greenhouse plants, it is constantly a difficulty for the judges to discriminate between what are actually subjects of the greenhouse and what should be excluded from such classes. Climatic differences and personal taste for the plants grown are both in part answerable for the difficulty. Similarly, confusion arises between stove and greenhouse plants.

At one time the difficulty existed with regard to, say, apples, but the R.H.S. drew up a schedule which defined for *Show purposes* those which are to be shown as "dessert" and those to be considered as "cooking" varieties. The dissection was necessarily arbitrary, but it answers its purpose admirably, and closes all disputes. The R.H.S. lists of dessert and cooking apples, pears, plums, &c. are now in general use for Fruit Show purposes throughout the country.

Since the Secretary of the R.H.S. has so repeatedly been asked to decide disputes on such plants as *Hoya carnosa* and the *Campanula pyramidalis*, the following lists have been prepared to define plants and flowers, just as fruits have been classified; but it must be remembered that the lists are for Show purposes only, and because a plant is classed as "greenhouse" it does not necessarily imply that it cannot be grown in the open air in some parts of the British Isles. The list is to help in *Showing*, and not in gardening. The Secretary

of the R.H.S. would be glad to receive suggestions for making the lists more complete.

It is suggested that the following should be added to all Show schedules in which classes for stove and greenhouse plants appear :

CLASSIFICATION.

Stove, and Greenhouse, and Hardy Plants.

With a view of removing difficulties and resolving doubts as to the distinction between stove, and greenhouse, and other flowering plants, the following list has been prepared by the Royal Horticultural Society and will be adopted for the purposes of this schedule.

The R.H.S. fully recognize the difficulty in differentiating between some stove and greenhouse, and greenhouse and hardy, plants. Differences of climate and personal taste both play a part in the selection of the plants cultivated under these heads. Everyone is, of course, at perfect liberty to cultivate such plants as he likes and how he likes, and where he likes, but for exhibition purposes it is absolutely necessary to secure uniformity by an arbitrary list of classification. It is impossible to enumerate all flowers—their number forbids. *The list contains only those plants and flowers which have actually been brought before the R.H.S. as giving rise to disputes, and others will be added as they are met with, or their uncertainty communicated to the R.H.S.*

STOVE PLANTS.

(*a*) Flowering.

Achimenes.
Begonias, fibrous rooted.
„ winter flowering, tuberous.
Bougainvillaea—all varieties.
Brunfelsia (Franciscea)—all varieties.
Clerodendron—all varieties, excepting C. foetidum and C. trichotomum.
Gloriosa—all varieties.
Gloxinias.
Hoya—all varieties.
Stephanotis floribunda.
Torenia—all varieties.
Zingiber officinale.

(*b*) Foliage.

Asparagus—all varieties except officinalis.
Cycas revoluta.
Nepenthes—fine foliage plants, not flowering.

GREENHOUSE PLANTS.

(*a*) Flowering.

Abutilon—all varieties.
Agapanthus—all varieties.
Agathaea coelestis.
Aloysia citriodora.
Amaryllis Belladonna.
Begonias, tuberous, summer flowering.
Bougainvillaea Sanderiana.
Bouvardia—all varieties.
Brunfelsia (Franciscea) calycina.
Calceolaria—shrubby varieties.
Campanula isophylla vars.
Canna—all varieties.
Cassia corymbosa.
Chironia ixifera.

GREENHOUSE PLANTS—*continued.*

Carnation—Tree varieties.
,, Malmaison vars.
,, American and other winter-flowering varieties
Citrus—all varieties.
Clematis indivisa.
,, lobata.
Clerodendron foetidum.
Clethra arborea.
Clianthus Dampieri.
Clivia—all varieties.
Coleus thyrsoideus.
Crinodendron Hookerianum.
Crinums.
Daphne indica.
Desfontainea spinosa.
Diplacus—all varieties.
Erythrina Crista-galli.
Francoa ramosa.
Fuchsias, hybrid.
Gerbera Jamesonii.
Heliotrope—all varieties.
Hoya carnosa.
Hydrangea hortensis vars.
Jasminum primulinum.
Kalanchoe—all varieties.
Lapageria rosea.
,, ,, alba.
Lilium speciosum (syn. lancifolium)—all varieties.
Luculia gratissima.
Magnolia fuscata.
Myrtus communis vars.
Nandina domestica.
Nerium Oleander.
Plumbago capensis.
Poinsettia pulcherrima.
Rhododendron javanicum.
,, jasminiflorum.
,, javanico-jasminiflorum hybrids.
Sarracenias, if in flower.
Streptocarpus—all varieties.
Trachelium coeruleum.

(*b*) FOLIAGE.

Adiantum cuneatum.
Asparagus—all varieties except officinalis.
Sarracenias.

HARDY PLANTS.

Buddleia—all varieties.
Campanula pyramidalis.
Choisya ternata.
Clerodendron trichotomum.
,, foetidum (syn. Bungei).
Crinodendron Hookerianum.
Crinum capense.
Crinum Powelli.
Desfontainea spinosa.
Erythrina Crista-galli.
Fuchsia gracilis.
,, globosa.
,, Riccartoni.
Phygelius capensis.
Romneya Coulteri.

NOTA BENE.

A Stove is a glass house having a minimum temperature of 55°–60°.
A Greenhouse ,, ,, ,, ,, ,, 40°–45°.

The following expressions are commonly found in schedules:—
(*a*) Stove *and* greenhouse plants; and
(*b*) Stove *or* greenhouse plants.

(*a*) Requires a mixture of both stove and greenhouse : there must be at least one stove plant, and at least one greenhouse ; (*b*) allows an alternative of either one, but excludes a mixture from both.

Generally it is the intention of a schedule to leave it to the option of the exhibitor whether to make up his group from either or from both sections. In such a case the class should be expressed thus in the schedule :—

Stove and/or greenhouse plants.

THE HISTORY AND DEVELOPMENT OF THE STRAWBERRY.

By E. A. Bunyard, F.R.H.S.

[Read October 7, 1913; Mr. T. W. Sanders in the Chair.]

The study of the history of cultivated fruits is attended with many difficulties, and not the least among them is the lack of definite records when such history extends into remote prehistoric periods. In the case, however, of the Strawberry such impediment does not exist, as the whole period of its development has occurred in comparatively modern times. This study is further made easier by the fact that from the earliest days of the history of the modern Strawberry there have been amateurs who recorded its progress with great exactness. We enter, therefore, upon this subject with a large body of precise historical detail which no other fruit can parallel.

The Strawberry thus offers peculiar opportunities for the study of the evolution of a fruit in its scientific as well as in its horticultural aspect, and while the latter is the principal consideration of this paper, the former will also be kept in view. The idea of a progressive increase in size and flavour owing to the effects of cultivation is one that is still held, and it will be of interest to see what support the history of the Strawberry can afford to this conception.

The first species of Strawberry which will be considered is *Fragaria vesca* L. (fig. 164), a native of Europe, and especially of its northern parts. This is the species which has been known to horticultural writers since the days of Pliny, and of which the herbalists make frequent mention. It is well known that this Strawberry varies in the wild state. A white form, a sterile form, and a large-fruited variety have been frequently noted. These variations, therefore, are obviously not due to cultivation, and the early gardeners may have cultivated either of these forms.

It is not easy to fix an exact date for the first mention of the Strawberry, but it is generally held that to Nicolas Myrepsus, a Greek doctor of the thirteenth century, must be accorded the honour. Both in Greek and Roman literature the *Arbutus* and the Strawberry were given a common name, a result of the theory of affinities then so much in vogue. Pliny, however, distinguished the difference in flavour, and the name 'fragum' must, no doubt, have been first applied to the fragrant Strawberry. It does not seem, however, that it was then a cultivated plant, and it is usual to place its introduction to cultivation in the fifteenth century. There is, however, ample evidence that it was found in gardens long before this; documents exist which prove it was thus grown in the early part of the

fourteenth century in France. The Royal Gardens at the Louvre under CHARLES V. possessed no fewer than 1200 plants, and many other records testify to the appreciation of the fruit by its presence in French gardens at this period.

From this time onwards this Strawberry has been under cultivation in gardens, and it will be interesting to see what improvement this long-continued period has effected.

The earliest illustration of the Strawberry in the Middle Ages is that to be found in the Mainz *Herbarius* of 1454 (p. 63), and a better illustration still is found in the *Gart der Gesuntheit* (*Ortus sanitatis*), Mainz, 1454, cap. 190.

The first work in which Strawberries are treated purely from the horticultural standpoint was the *Théâtre d'Agriculture* of OLIVIER DE SERRES, 1600. Here we find the Strawberry valued as much for its decorative use as for its fruit. It is recommended that plants should be taken from the woods, as the transplantation to fresh soils will increase the size of the fruits. This improvement, however, was recognized to be due only to the freedom from competition with other plants and to the extra vigour obtained by the removal of runners. The wild Strawberry had therefore at this time been grown as a garden plant for some 300 years, and no improved variety had so far been recorded. This fact is worthy of notice, as at this time the American varieties, which have played so important a part in the development of the modern Strawberry, had not yet reached Europe. There are, therefore, no complications of cross-breeding, and the effect of cultivation alone is concerned, and in this case it did not cause any improvement of the type.

It may be here objected that varieties of *F. vesca* of increased size do now exist, and that they may not have arisen through cross-breeding but by continued cultivation. There are, however, instances recorded where large-fruited forms have been found in a wild state. In WESTON'S *Botany*, vol. iii. p. 325, is mentioned the Northumberland Wood Strawberry "the size of a small nutmeg, finer than the garden kind." This was found wild by a stream near Newcastle.

From this and analogous cases it is evident that the production of large-fruited forms is not always and only associated with cultivation.

The history of the modern Strawberry may be said to date from the early seventeenth century, as the introduction of *F. virginiana* took place about this time; but before we study the influence of this new species the varieties of *F. vesca* which have appeared may be briefly considered. In 1890 the curious *F. eflagellis* was first mentioned. This form, as its name indicates, produces no runners, and its compact habit has given rise to the name "fraisier buisson." This is obviously a variety produced by the loss of a unit character, and cannot be claimed as a horticultural improvement. It is interesting to note that large-fruited varieties have also given seedlings which failed to form runners.

The one-leaved form, *F. monophylla*, has a curious and interesting history, which shows how identical sports may arise both under cultivation and in the wild state at different periods. The first record of this form is in a picture by HOLBEIN, which is now in the Pinakothek at Munich. This must have been painted in the early part of the sixteenth century. Secondly, it was recorded by LINNÆUS as occurring wild in Lapland, and lastly its appearance in a bed of *F. vesca* at Versailles in 1761 is described by DUCHESNE (fig. 165).

The next variety of importance was the so-called Alpine Strawberry (fig. 166), the origin of which has been the cause of much discussion. The sole point of difference from *F. vesca* is its habit of producing autumnal fruits. As is well known, *F. vesca* will, under certain conditions of moisture and temperature, produce retarded flowers late in the season, and this fact makes it difficult to distinguish it, when growing wild, from the true Alpine variety, in which the autumnal production is a definite and regular character. The first mention of this variety is probably that of JEROME BOCK or TRAGUS in 1530. CONRAD GESNER also mentions it, and his description leaves no doubt of its identity. "Fraga vera tota aestate florent inque maximam autumni partem" (*De Stirpium Collectione*, 1553). His special study of alpine flora rather tends to the opinion that this plant is not of garden origin. It was probably not until the eighteenth century that it became a garden plant. About 1768 it was described by MILLER in his *Dictionary* as a rarity, and it was generally believed to have been introduced from Turin. From this time it was rapidly distributed in Holland and France. In 1764 DUHAMEL DU MONCEAU received seed from Mont Cenis, which would seem to establish its alpine origin.

Since this date many varieties of this species have appeared in gardens. The most striking was the 'Gaillon,' so called from the locality of its origin, where it was found by M. LE BAUDÉ about 1825. This is a variety without runners which is known in France as the "buisson," and is still largely used for borders in the kitchen garden. Red and white fruited forms exist, as also in the original Alpine Strawberry.

Many varieties with large fruits have been since brought forward. In 1855 the 'Reine des Quatre Saisons' was introduced by M. GAUTIER, a cultivator who made a fortune at the time of the Second Empire by the cultivation of Alpine Strawberries for market. The great popularity of the Alpine Strawberry at this time caused the forcing of this variety to be largely undertaken, and growers selected their own seedlings and kept the stock carefully to themselves, and they were known on the Paris markets by the raisers' names. The well-known 'Millet' was one of these. It is, of course, impossible to say how much, if at all, these improved varieties owed their size to crossing with other larger-fruited types, but the following experiment of M. HENRI DE VILMORIN is of interest in this connexion.

Plants of Alpine Strawberries growing in the neighbourhood of

Bargemon, the locality which is generally considered as the first source of the alpine form, were planted in the experimental garden. These plants produced fruit in the second year which was equal in size to the "improved" varieties such as 'Janus,' 'Belle de Meaux,' and 'Berger.'

This remarkable experiment may, of course, be claimed as a result of improvement by cultivation, but on the other hand it may be remarked that if cultivation for over 100 years produces no greater result than that resulting in one year, its effect is, to say the least, limited. Fuller details will be found in the *Revue Horticole*, 1902, p. 410.

Having now traced briefly the development of *F. vesca* and its alpine variety to modern times, it is necessary to return to the other European species, *F. elatior*, the Hautbois Strawberry, and to see what cultivation may have done for this species.

Growing wild in Europe, though in a less extended area than *F. vesca*, it was of course especially likely—on account of its strong musky flavour—to be introduced to garden culture. It is not, however, specified by OLIVIER DE SERRES in the *Théâtre d'Agriculture*, but the botanists of the sixteenth century frequently mention it, as for example DODONÆUS. The garden varieties produced have not been many, but the 'Royal,' 'Framboise,' and 'Apricot' had for some time considerable popularity in France, and in England the 'Black,' 'Globe,' and 'Prolific' were at one time much cultivated.

To the end, therefore, of the sixteenth century the two European species of Strawberries had been cultivated without attaining any remarkable increase in size, and all the varieties recorded were such as were easily distinguishable as but slight variations or defective varieties of these species.

In the early part of the seventeenth century the Virginian Strawberry (fig. 167) was introduced into Europe. The exact date of its arrival is uncertain, but it was recorded in 1624 by JEAN ROBIN, botanist to LOUIS XIII. TRADESCANT was then making his journeys on the Continent in search of novelties, and it is probably to him that we owe the introduction of this species into England.

The bright colour and good size of this fruit led to its extended cultivation, but it is remarkable that, notwithstanding the variations of soil and climate to which its introduction to England and France must have exposed it, more than 100 years elapsed before any variation appeared. DUCHESNE, in 1766, speaks of a variety from Strassburg having longer fruits than the type, and a similar variety called the 'Oblong Scarlet' was raised by Mr. GIBBS, a nurseryman at Old Brompton, some time before 1826.

About this period many new varieties appeared, such as the 'Grove End Scarlet,' raised by WILLIAM ATKINSON at Greve End, Marylebone, in 1820, the 'Duke of Kent's Scarlet,' 'Knight's Large Scarlet,' &c.

Many varieties were also raised from seed imported direct from

Fig. 164.—Fragaria vesca, linn.

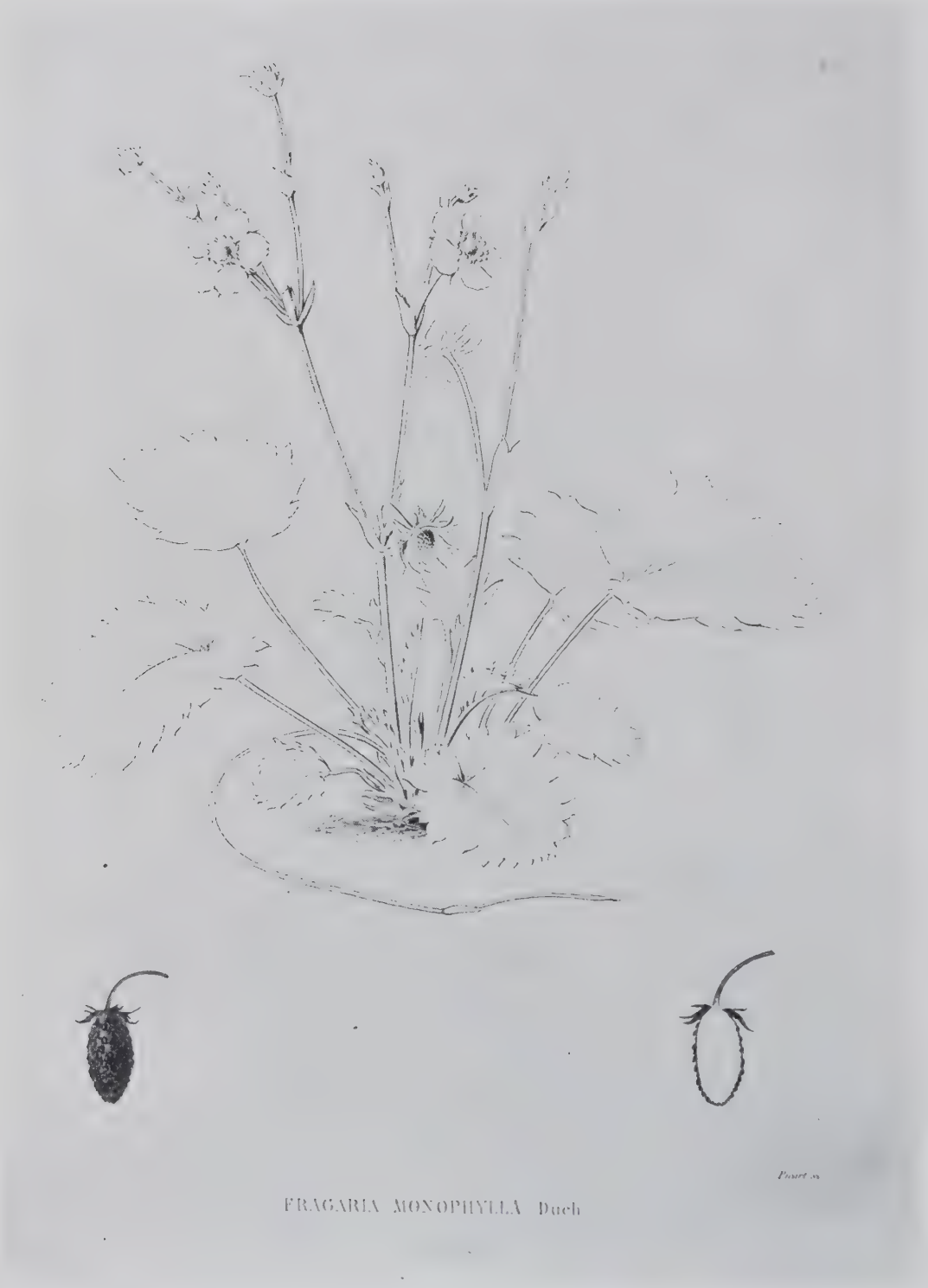


FIG. 165.—FRAGARIA MONOPHYLLA, Duch.

Fig. 166.—The Alpine Strawberry.

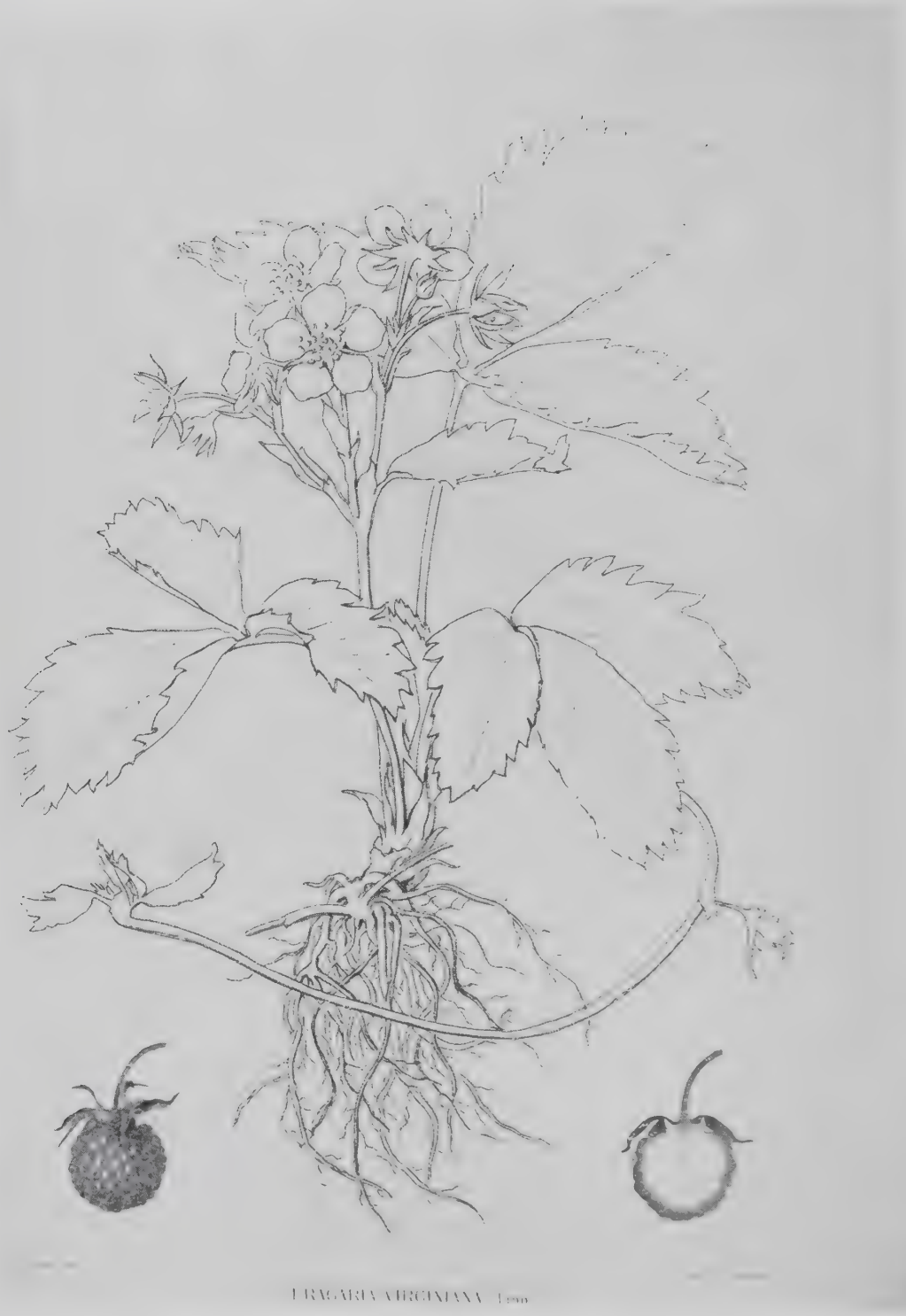


FIG. 167.—FRAGARIA VIRGINIANA, LINN.

[*To face p.* 545.

Canada and North America, and some of these showed some slight differences, but not more than might have been met in the wild state.

We see, therefore, that *F. virginiana*, left merely to the stimulus of cultivation, did not produce any varieties of special size or remarkable in other qualities, and it was generally admitted that for flavour the original type was unsurpassed. Nothing at all approaching in size the Strawberry of modern times had been produced, and the reason of this was, doubtless, that no character giving large fruit had been introduced into the gametic constitution of existing fruits.

The introduction of the Chilian Strawberry, *F. chiloensis*, brought, however, the required size into combination with the flavour of the Virginian, and thus laid the foundation of the fruit as we know it to-day. The introduction of the Chilian Strawberry was, therefore, an event of the first importance in Strawberry history and deserves detailed treatment.

Fragaria chiloensis is found wild in Chile, principally in the Chonos Archipelago, in Valdivia, and the Juan Fernandez Islands. It is also found on the Pacific coast region of North America and in Alaska. It is the Southern form only, however, which we are now considering. The general character of the plant is well shown in fig. 168, and the colour of the fruit is a yellowish-rose, shading to a rather darker tint. The variety 'Louis Gauthier' is a close approximation to the wild type.

The Spanish name 'Frutillar' was adopted by DUCHESNE and translated into 'Frutiller,' by which name it was long known in France.

Its introduction to Europe was due to a French officer named, by a curious coincidence, FREZIER, the name being a Gallicized rendering of the Scotch Fraser, from which stock he was descended. In his travels he found this Strawberry both wild and cultivated, and its large size induced him to attempt its introduction into Europe. The long journey from Chile to France and the scarcity of fresh water rendered the importation of the young plants a matter of some difficulty, but five plants survived. One of these was planted near Brest and became the parent plant of the large Strawberry industry still carried on in that district. The plants happened to be all females, and for some years no fruit was seen, from lack of pollenizers. DUCHESNE, of whom we shall speak in detail later, succeeded in fertilizing it with the 'Hautbois,' and fruit resulted. In the district of Brest it was planted among other varieties, and thus, being naturally pollenized, large crops were produced. In 1857 180 hectares are said to have been occupied by this variety, and it was exported even to England. It was not long before seedlings were produced, the most widely cultivated being the so-called 'Pine' or 'Ananas' Strawberry.

Much discussion arose over the origin of this fruit, which was first figured and described in the seventh edition of MILLER's *Dictionary*. Among the countries to which it was referred was Surinam, and it

was for long called the Surinam Strawberry. The COMTE DE LAMBERTYE, the great historian of the Strawberry, leaves the question of origin undecided. There is, I think, no doubt that it is a seedling of *F. chiloensis*, and a passage in DUCHESNE'S *Histoire des Fraisiers*, which seems to have been overlooked by previous writers, establishes the point. In a note of recent observations printed at the end of his book the following passage occurs: "Les graines des Frutilles envoyées de Cherbourg en 1764, et semées tant dans notre jardin qu'à Trianon et au jardin du Roi, y ont produit de véritables Fraisiers-ananas. Nous venons de l'observer dans leurs premières fleurs, qui sont hermaphrodites parfaites. Cela nous apprend l'origine du Fraisier-ananas, et quelle est la dégéneration ordinaire du Frutiller en Europe."

Other varieties which showed evidence of descent from this species were the 'Carolina' and the 'Bath,' and *F. grandiflora*. The differences between these varieties were very small, and constant confusion resulted as to which was the true type. LAMBERTYE considered them identical.

Having now described the introduction of the species which provided the material from which the Strawberry of our time has been derived, it remains to show the means by which this has been raised to its present perfection, and to say something about the workers to whom it was due.

Though the fact of the separation of the sexes in plants had been partly realized by the Egyptians and Greeks, it was not fully understood until much later days. BACON, in his *Natural History*, saw the possibilities of cross-fertilizing for the production of new varieties, but his suggestion bore no fruit until the experiments of BRADLEY and MILLER in the eighteenth century. These were, however, concerned with flowers, and it is probable that the first crossings of fruits were made by DUCHESNE (fig. 169), whose *Histoire Naturelle des Fraisiers* forms the starting-point of the literature of the Strawberry. This remarkable writer was born in 1741 at Versailles, where his father was Inspector of Buildings. The wonderful horticultural collections in the gardens of the Trianon were at the disposal of the young student of botany, and to such good use were they put that at the age of seventeen he published his first work, the *Manuel de Botanique*, and two years later his monograph on the Strawberry appeared. In this work the varieties of this fruit are described with the greatest minuteness and an attempt is also made to classify them genealogically, a notable undertaking when the current botanical doctrine of constancy of species is considered.

In other ways DUCHESNE showed great independence of mind, and to devote a book to the accurate description of garden plants at the time of LINNÆUS was in itself a bold departure. As an example of careful observation his study of the cause of sterility of the 'Hautbois' may be quoted. Current opinion held that this fruit was degenerating, as it was becoming less fruitful. DUCHESNE was able to

show that the cause was the gradual weeding out of the male plants on account of their infertility, thus leaving the female plants without pollenizers. This cause had been overlooked owing to the fact that both plants were apparently hermaphrodite, but the anthers in the female plants, though present, bore no pollen, and similarly in the male plants the ovaries did not function.

It is not possible here to refer in fuller detail to this interesting book or its writer. Suffice it to say that the *Histoire Naturelle des Fraisiers* remains a classic in Strawberry literature, and a book to which all historians of this fruit must constantly refer.

The stimulus which might have been expected to result from this work in France was lost in the confusion of the Revolution, when gardeners found uses for their pitchforks outside the seclusion of their gardens, and many pruning-hooks were beaten into swords.

It was in England that the next chapter of Strawberry history was written, and to THOMAS ANDREW KNIGHT and MICHAEL KEENS must be given the honour of laying the foundation of the Strawberry of the present day. As has been stated above, the two most important species had existed for some time in England, and it was to the crossings of early descendants of *F. virginiana* and *F. chiloensis* that this success was due. At the end of the eighteenth century a well-furnished English garden would have contained the following varieties and species: *F. vesca*, *F. elatior*, and their varieties as described above; *F. chiloensis* and its varieties, 'Carolina,' 'Pine' or 'Ananas,' and *F. virginiana* and its varieties 'Duke of Kent' and 'Austrian Scarlet.'

The credit of raising the first large-fruited Strawberries belongs to MICHAEL KEENS, a market gardener of Isleworth. Having been a raiser of seedling fruits for many years, he chose in 1806 some seeds of the Chile Strawberry and obtained many seedlings, mostly white, but one of outstanding merit was found and named 'Keens' Imperial' (*Trans. R.H.S.* vol. xi. p. 101, coloured plate). The importance of this fruit in Strawberry history is due to the fact that it was seed parent to the renowned 'Keens' Seedling' which was produced in 1821. The large size and excellent flavour of this fruit created a sensation which probably no succeeding Strawberry has ever equalled. The Royal Horticultural Society showed its approval by a coloured plate in its *Transactions* (vol. v. p. 261), and by presenting the raiser with a silver cup. It is interesting to know that this cup exists in London at the present time. In many respects it may be said that this remarkable fruit is hardly surpassed at the present day, and though in some one aspect or another varieties may be found which outclass it, its influence as the principal parent of the large-fruited race of Strawberries cannot be overestimated.

The success, however, of KEENS was rather in the nature of a happy chance, and it is to THOMAS ANDREW KNIGHT that we owe the first scientific attempt at Strawberry breeding on a large scale. The first account of KNIGHT'S work was printed in the *Transactions* of this Society (vol. iii. p. 207). From this paper it is evident that

extended experiments had been made, as he states that all the available varieties and species of Strawberries were found to breed together, and that he considered them therefore to be all "varieties of the same plant." Over 400 seedlings resulted from the above crosses, some of which later became famous.

The first of these was the 'Downton,' which is described and figured in the *Transactions* (vol. iii. p. 396). The female parent of this variety was raised from seed imported direct from America by a Mr. W. W. CAPPER, of Birmingham. From what part of America they were received is not specified, but the fruit was classed as a Virginian. This was pollenized by the 'Old Black,' a variety of uncertain origin. The result was a large oblong fruit showing many resemblances to *F. chiloensis*. In view of the uncertainty which exists as regards the origin of its parents, the 'Downton' cannot be claimed as a definite case of a *virginiana* × *chiloensis* cross.

The second variety which was raised by KNIGHT was the 'Elton Seedling.' This fine fruit quickly established itself as a good late variety, and may be found still in cultivation. Of its origin there is no record.

These two varieties of KNIGHT'S, and 'Keens' Seedling,' are of the greatest importance in the history of the Strawberry. Their appearance created something of a furore. In France they were welcomed as the greatest advance so far achieved, and for many years these large-fruited sorts were there known as 'Fraises Anglaises.'

This great success had the result of stimulating breeders to fresh efforts, and in this country many varieties of great excellence soon appeared.

Mr. JOHN WILLIAMS, a successful raiser of many fruits, whose memory is kept alive in the many varieties bearing the name of his house 'Pitmaston,' was among the first in the field; and though his Strawberries are now almost out of cultivation, they took for some time a leading place.

MYATT, of Deptford, introduced in 1840 his most famous seedling 'British Queen,' which is yet one of the best flavoured. 'Admiral Dundas' (1854), another seedling, was long a standard variety, and 'Eleanor' (1847) is still grown with success. His seedlings are believed to have been raised from KNIGHT'S varieties.

Another successful raiser in rather later days was BRADLEY, gardener at Elton Manor, Nottingham. He succeeded in producing two magnificent fruits, 'Sir J. Paxton' (1862) and 'Dr. Hogg' (1866), both of which are too well known to-day to need further comment.

The impetus given by KNIGHT and KEENS spread rapidly also to the Continent and America. In France PELEVAIN introduced in 1844 'Princesse Royale,' a variety which was for more than fifty years the leading French fruit. His 'Comte de Paris' was raised in 1846 from a seed of 'Elton,' showing thus the influence of the English stock. In 1852 the firm of JAMIN raised and introduced the well-known 'Vicomtesse Héricart de Thury,' and in 1865 BERGER

of Verrières, raised the variety 'Dr. Morère.' This fruit in France is now as widely grown as is 'Royal Sovereign' in England, and is very probably a descendant of 'Elton.'

In America 'Keens' Seedling' was soon introduced, and already in 1837 a seedling of great merit, 'Ross Phœnix,' had been raised from it.

Space will not permit a detailed report of the varieties raised in Germany by GOESCHKE, in France by GAUTIER, Dr. NICAISE, and GLOEDE, and in Belgium by DE JONGHE. Many of their seedlings had a vogue in this country for many years, but they were overshadowed by the remarkable work of LAXTON in England, who initiated and carried on a series of experiments in Strawberry raising which have probably never been equalled in extent.

THOMAS LAXTON (fig. 170) started his experiments about 1865, and from the first carried them out with the greatest perseverance. His first work was mainly with garden peas, but on his removal to Bedford in 1878, when he was able to devote his whole time to cross-breeding, he gave much attention to the Strawberry. His first great success was with 'Noble,' which was introduced in 1884. This variety was probably the only one of his introductions which was a natural hybrid. The same year saw the first appearance in commerce of 'King of the Earlies,' 'Duchess of Edinburgh,' 'Captain,' and in 1892 'Royal Sovereign' appeared. This remarkable variety, a cross between 'King of the Earlies' and 'Noble,' was in its way as great an advance as 'Keens' Seedling,' and it still remains the type of highest excellence. Its influence on succeeding varieties has been great, but it may safely be said that since its day no new sort has stood out with such prominence.

Since then the greatest advance has been in the production of later varieties. 'Latest of All' was introduced by LAXTON BROTHERS in 1894, and 'Givons Late Prolific,' raised by Mr. PETERS, of Givons Gardens, Leatherhead, provided a new standard for these later fruits.

Of the autumnal fruiting varieties it is not necessary to speak in detail, as a full and lucid account was given by M. HENRI DE VILMORIN in the *Journal* of this Society, vol. xxii. Part 3 (1899). The combination of the large size with the autumn-fruiting character was only reached after much disappointing trial, and it was not until the introduction in 1893 of 'St. Joseph' that a really satisfactory result was accomplished. Since then many excellent varieties have been brought forward, and one of the latest, 'St. Fiacre,' which was introduced in 1911, probably represents the highest achievement in this section.

Having now briefly discussed the development of the Strawberry and the work of those to whom it was due, there remains another class of workers who, though not raisers themselves, were interested in the fruit on the systematic or literary side. The first of these was DUCHESNE, of whom mention has been made above.

The next detailed treatment of importance is the remarkable

paper published in the *Transactions* of this Society.* This was contributed by Mr. JAMES BARNET, under-gardener in the fruit department at Chiswick, and was presented in 1824. The descriptions of the fruits and also of the plants, and the clearing up of the many synonyms, all show a master hand, and it is safe to say that had this monograph been published in book form the author would have occupied to-day a prominent place among those who have written on the Strawberry. It may be remarked in parenthesis that ROBERT THOMPSON has shared a similar fate. His excellent monographs on the apricot and the cherry well deserve re-publishing. In 1857 the paper of GAY upon the species and distribution of the Strawberry was published (*Annales des Sciences Naturelles*, Série 4, Botanique, VII. pp. 185–208). This is, of course, mainly of botanical interest.

In the same year the *Jardin Fruitier du Muséum* of DECAISNE was published, and the part dealing with Strawberries was entrusted to MADAME ELISA VILMORIN, who had, at Verrières, gathered together a remarkable collection of these fruits. The descriptions in this work are evidences of the keenness and ability with which these studies were carried on. By the courtesy of M. MAURICE DE VILMORIN I am enabled to give the accompanying portrait (fig. 171).

The next writer of prominence was the Comte LÉONCE DE LAMBERTYE, whose book appeared in 1864. This writer spent the years of his country retirement at Chaltrait in growing all varieties of Strawberries obtainable and in the study of their history and literature. No more complete work on this fruit has ever been published, and for the history of Strawberry development up to his day it stands unrivalled.

In 1874 FRANZ GOESCHKE published his *Buch der Erdbeeren*, which treats of the botanical and cultural side mainly, with excellent descriptions of a large number of varieties. Except for the historical portions, it fills the same place in German literature as does LAMBERTYE'S work in French.

Since this date many small works have been published (for which see bibliography at end), but no important descriptive book has appeared.

So much careful work has been done in the study of Strawberry history that it is not possible to discover much that is new. It may be well, however, to emphasize once more the great importance of the work of KEENS and KNIGHT, as this has been overlooked by previous writers. No chapter in the history of the Strawberry is more important both from its practical and from its scientific aspects.

In conclusion the writer submits that the history of the Strawberry offers but little support to those who believe in the paramount influence of cultivation in the production of new forms. Its entire development has been due to the introduction of new species having some quality not possessed by existing varieties and its admixture with these by cross-breeding.

* See *Transactions Horticultural Society*, vol. vi. (1826), p. 145.

Bibliography of the most important Works on the Strawberry.

Only such works are noted as deal mainly with the Strawberry or contain original descriptions.

1766. *Histoire Naturelle des Fraisiers.* M. Duchesne Fils. 8vo. The first monograph on the Strawberry, and of the greatest importance. A second edition was published in 1786.

1824. "An Account and Description of the Different Varieties of Strawberries which have been cultivated and examined in the garden of the Horticultural Society." By James Barnet, under-gardener in the Fruit Department. *R.H.S. Transactions,* vol. vi.

This most valuable paper represents real work in description, classification, and the rectification of nomenclature. It is the source from which numerous later writers have drawn, with and without acknowledgment.

1857. "Recherche sur les Caractères de la Végétation du Fraisier." By S. Gay (*Annales des Sciences Naturelles,* Série 4, Botanique, VII. pp. 185–208).

Dealing chiefly with botanical characters and geographical distribution.

1857. *Le Jardin Fruitier du Muséum.* Descriptions of Strawberries by Madame Elisa Vilmorin.

Gives valuable descriptions and figures of nearly all species of *Fragaria* and of the principal garden varieties of the day. The plates of this work are of an excellence never since equalled.

1864. *Le Fraisier, sa Botanique, son Histoire, sa Culture.* Par le Comte Léonce de Lambertye.

The most complete work ever published on the Strawberry, representing the study of many years. No figures or plates.

1865. *Les Bonnes Fraises.* By Ferdinand Gloede.

A small work of a popular nature, with cultural notes and short descriptions.

1866. *Die Himbeere und Erdbeere.* By Dr. E. Regel.

Short descriptions of species and varieties, with poor coloured plates of little merit (44 pages).

1874. *Das Buch der Erdbeeren.* By Franz Goeschke.

Deals with culture, botanical characters and garden varieties, somewhat after the style of Lambertye. Twenty-seven woodcuts of fruits.

1898. *Les Fraisiers.* By A. Millet. Fifty-two engravings.

An excellent work, treating all branches with clarity and exactitude. Many valuable historical details.

1899. "Perpetual Strawberries." By M. HENRI DE VILMORIN. *Journal R.H.S.* vol. xxii. Part 3, 1899.
A full and excellent description of the genesis of the modern autumnal Strawberry.

1900. *Culture du Fraisier.* By GUSTAVE FALIÈS.
A study largely from the commercial standpoint.

1909. *Les Fraisiers Remontants.* By Abbé TOURAINE.
Treating of the culture of the autumn-fruiting varieties, with a coloured plate of varieties raised by the author.

[NOTE.—The figures of strawberries are from *Le Jardin Fruitier du Muséum.*]

FIG. 168.— FRAGARIA CHILOENSIS (p. 545.)

[*La face p.* 55[illegible].

Fig. 169.—Antoine Nicholas Duchesne.
(*Gardeners' Chronicle.*)

Fig. 150.—Mr. Thomas Lucas.

FIG. 171.—MME. ELISA VILMORIN.
(From a miniature.)

[To face p. 553

THE EVOLUTION OF PLANTS, AND THE DIRECTIVITY OF LIFE, AS SHOWN BY THE REPRODUCTIVE ORGANS.

By Rev. Professor Geo. Henslow, M.A., F.L.S., V.M.H.

[Read October 21, 1913; Mr. Bernard W. Crisp in the Chair.]

In my last lecture I dealt with the evolution of the vegetative organs of plants. I propose now to consider, theoretically, what may have probably been somewhat of the process by which the floral organs have been evolved.

The belief is universally accepted that the sepals, petals, stamens, and carpels of flowers are fundamentally identical with leaves and are interchangeable with them; as may be witnessed by the Green Rose, wherein every organ is represented by a green leaf.

If we search among the relics of plant-life in the strata of the earth, we soon find that the geological history of plants is so imperfect that not very much has been discovered to throw light upon the origin of flowers. Many reasons exist, however, for believing that the conifers and other members of the "naked-seeding" plants, called therefore "Gymnosperms," have descended from the higher seedless or spore-bearing Cryptogams, such as Ferns or fern-like plants.

The Gymnosperms, we have every reason to believe, gave rise to Dicotyledons; but the links are unknown between these naked-seeded plants, having no carpels to include the ovules and carpellate plants. The Monocotyledons are undoubtedly a later evolution, having been derived from aquatic Dicotyledons.

The first change, from leaves into parts of flowers, is to reduce them to scale-like structures, as in our Pines, which have two kinds of foliage, needle-like and scale, leaves. There are no sepals or petals; the scale developing anther-cells with pollen is wholly green in the Cypress, with four yellow anther-cells; but in the Pine the whole scale is yellow, so this colour seems to have been the most primitive change from green.

Ovules arise as outgrowths from the "carpellary scale," a branch from the vascular bundle being clothed with tissue and converted into the female structure. A reverse may occur in foliaceous flowers; for in a "monstrous" Mignonette the carpellary leaf bore little cup-like extensions from the vascular cords. Even cabbage-leaves will sometimes produce similar excrescences; these also show the homology with ovules.

When, however, we search for previous causes, and ask *how* and *why* the internal tissue of a leaf-blade can become pollen-grains,

and the above outgrowths the female ovule, science can find no answer. Our final appeal is to the mystery of the Directivity of Life.

Let us now take an ordinary flower, such as a Buttercup, and try to discover the origin of sepals and petals.

Sepals, like bracts, from the axils of which arise flowers, are seen to be the petioles only, the blade being suppressed. The flower of any Rose shows how the sepals are reduced leaves, the leaflets being still present in a more or less rudimentary condition, while in a "monstrous" case a blade was borne at the tip of a sepal in a Buttercup.

A precisely similar origin of bracts from petioles is to be seen in the Hellebore, a perfect series of transitions can be found between a true leaf and a small boat-shaped bract below the flower. In some cases Nature has suppressed the stalk or petiole, but retained the blade to form a bract, as in Buttercups.

Nature has adopted two ways of making petals. As a leaf consists of a petiole and blade, so a petal can be made out of either. Thus, in Buttercups, the Winter Aconite, and Hellebores such as the Christmas Rose, in the Aconite and Columbine—all belonging to the Buttercup family—the first attempt at a petal is to convert the anther into a honey-pot, by leaving the cells open at the top and secreting honey within them, instead of developing pollen. They stand on the outside of the many stamens which these flowers have. Of course, the honey is for insects, which must first have come to eat the pollen. As there are no true petals, the calyx is either white or coloured instead of being green, such as yellow in the Winter Aconite, blue in Larkspur and the Aconite, white or purplish in the Christmas Rose &c.

The next step is to convert a honey-pot into a true petal. This is well seen in the species of Buttercup (*Ranunculus auricomus*) called "goldielocks" found in woods.

Selecting a number of such "petals," there can be made a series ranging between anthers turned into honey-pots and true petals, by *one side*, the outermost, being enlarged, and the inner side remaining small. The final and permanent result is seen in any ordinary Buttercup, in which it will be observed that the honey is secreted in a little pit at the base of the petal, having a very tiny flap on the inner side.

In the true Aconite two stamens have taken the form of crosiers, while the anthers are converted into S-shaped "nectaries," as all such special honey-secreting structures are called.

We will now consider the other method. We find it in this same family; for among the Anemones (which, as a rule, secrete no honey and have no corolla, only a white or coloured calyx), the Pasque-flower (*Anemone Pulsatilla*) has the outer stamens, with rather broader filaments; these secrete honey, indicating a slight approach to nectariferous petals, but *not* made out of the anthers.

In the Water-lily the change from filaments into petals is very

obvious, but with or without any intermediate condition of secreting honey as in the Pasque-flower.

If the petals be observed from the middle of the flower of a Water-lily to the circumference, the anthers will be found to get smaller till they quite disappear, and a perfect petal results, composed solely out of a broadened filament.

We must now consider the uses of the floral organs.

Everyone now knows that no seed can be "set" or give rise to a new plant unless the pollen has reached the stigma of the carpel which contains the ovule, which must be fertilized by the pollen. All flowers are so constructed that this can be secured either by "self-pollination," when the pollen from the anthers is applied to the stigmas in the same flower; or the flower may be "crossed" by pollen carried by the wind from one flower to another; or, lastly, it may be conveyed by insects or, rarely, by birds. One notices that flowers solely fertilized by pollen brought by the wind are not attractive by means of colours or scents; as in most grasses, docks, sedges, and some trees, as the hazel, oak, and poplar.

Those which are habitually self-fertilized are for the most part insignificant little flowers, often scarcely, if at all, expanding; and a noticeable feature about them is that such plants are by far the most prolific; and, though often small herbs and annuals, will soon smother other plants, as in a neglected garden; as, *e.g.*, groundsel, shepherd's purse, *Solanum nigrum*, &c. Flowers conspicuous by being white or coloured, with or without scent, are constructed so as to attract insects, which in visiting one flower get dusted with pollen often in a definite part of the body. This part is then struck by the stigma of another flower of the same kind, the stigma of which is purposely so situated as to receive the pollen conveyed to it.

It was the innumerable ways in which this "crossing" is secured that led Darwin to say "Nature abhors self-fertilization." He subsequently withdrew this strong statement; for his experiments showed him that when a plant was artificially self-pollinated, and the results compared with others of the same kind which had been artificially crossed, not infrequently the offspring of self-pollination beat those of his crossed plants both in height and fertility!

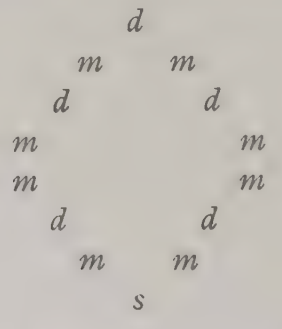
The question at once arises, how did "irregular" flowers arise from the others? In a regular flower the members of the "whorls" are all alike, as those of the calyx, corolla, stamens, and carpels respectively in Buttercups; whereas, in the Labiates, the petals (united into a tube) are not exactly alike, the front petal being enlarged to form a lip, just as in Orchids &c. Indeed, in Salvias, the departures from "regularity" are about twenty in number, every one of which is a useful, purposeful adaptation, primarily for the benefit of the insect; so that it in return will most easily pollinate the stigma with greater certainty.

It will be observed in all flowers habitually crossed, that the honey-secreting gland is just where the tongue or proboscis of the insect is

directed to go ; the spots and streaks called " guides " are localized on one or more petals and so direct the insect to the right spot ; they are often on the " lip " only, as in Orchids, or on the hindermost petals, as in Pelargoniums and Rhododendrons. In the last cases the stamens and style are " declinate " ; that is, they curve downwards, and then raise the anthers and stigmas to strike the under-side of the insect ; whereas in the Dead Nettle and Foxglove they stand erect at the back of the flower, and so strike the visitor on the head or back.

So innumerable and universal are the adaptations to insect visits that the *probabilities* of there having been a " direct cause and effect " accumulate until the conclusion becomes a " moral conviction " or " inductive proof " that such has been the case. In other words, they would appear to be responsive growths, and the honey a responsive secretion to the irritations set up by the visitors themselves. As a corroborative illustration to this theoretical origin of honey-glands, we may recall the adhesive pads of the Virginia creeper, which are only formed *after* contact with a wall. Other examples might be given, such, *e.g.*, as the developments to meet strains and weights ; for if a weight be hung on to the growing petiole of a leaf, the mechanical or supportive tissues will be increased to meet the unusual strain. Similarly the number of supportive vascular bundles in the tubular calyx of a Labiate may be increased from five (the midribs of the calycine leaves) to ten, thirteen, or fourteen (in *Salvia*). This increase, with the enlargement of the front petal into a lip, is thus enabled to bear the weight of a comparatively heavy insect.

The accompanying diagram will explain how the supportive " ribs " are added in proportion as the weight of the insect increases. *d* stands for the " dorsal " or midribs of the five sepals. These five are the only ones the sepals possess when free. When they cohere by their margins, one marginal cord (*m*) is added between the hindermost sepals, but, the weight being on the anterior sides, two are inserted there (*m m*). In *Salvia*, in which the calyx is greatly " stretched," a supernumerary cord (*s*) is inserted between the two anterior marginal cords. The number of ribs or cords varies in different genera.



We cannot corroborate this " inductive proof " by experimental evidence, as we do not know how long it took to convert a regular flower into an irregular one ; but " reversions " in a way corroborate it.

It is a universal fact both in the vegetable as well as in the animal

kingdom that "disuse" brings about "degeneracy"; so that reversions to more primitive forms often occur. Thus, gardeners encourage the transformation of the naturally irregular corollas of Pelargoniums, Gloxinias, Pansies, &c., into regular ones.

Again, irregular flowers are mostly situated close to the stem, so that the insect *must* visit it from the front and not all round as in a regular flower. The influence of its weight is thus "felt" only on the anterior side of the flower; but when it is a terminal flower of a spike, as of Foxglove, Aconite, &c., or the middle flower of a "truss" of Pelargoniums, then the flower often reacquires regularity, and the honey-secreting organ is wanting, as it presumably was before the ancestor became adapted to insect-visitors. Another result may occur when, from migration or other cause, the flower is no longer visited. It then becomes degraded in all its parts, but assumes self-fertilization and is quite independent of insects. This I found to be the case with all the plants I could examine in the desert near Cairo, where no insects occur, or are very rarely to be seen. Self-pollination is secured by bringing the anthers into direct contact with the stigma. This, in fact, is their normal position in the bud-state; but at *that time* the pollen and stigmas are not matured for pollination; but in buds which never open at all, as in Violets and many others called "cleistogamous" or "concealed unions," as we might translate this word, they mature simultaneously within the bud. Cold weather may have the same effect. The chickweed opens its little flowers in sunny weather when the filaments bear a honey-secreting gland; but in a "mild" winter it may continue to form seed while permanently in bud.

The question may be now asked: What is the "good" or advantage to the plant of being crossed? The answer depends upon what we understand by the word "good."

The two "ends" of plant-life are a vigorous existence until the plant dies a natural death and the production of an abundance of good seed. Now, it is notorious that self-fertilizing weeds propagate to an enormous extent in a neglected garden or arable field. They are usually small annuals with inconspicuous flowers; but the result is obviously in favour of self-fertilization. These and wind-fertilized species of plants are by far the most widely distributed over the globe. On the other hand, the plants with flowers specially adapted to insects may have finer flowers, but their dispersion is much more restricted.

In experiments such as Darwin's,* when crossing is carefully made, the plants receive an unnatural stimulus, and finer plants are often the result, so that this process is invaluable to horticulturists; but if it be continued generation after generation with the same kind of plant, the possibility of a *continued improvement* may completely fail. As examples, one well-known grower of Primroses found that by repeated crossing, good seed became so difficult to

* *Cross and Self-fertilization of Plants.*

procure that he finally lost a whole stock of the finest sorts. A cultivator of Cyclamens met with the same result, so he always kept a number of "weedy" plants, as he called them, for they set seed abundantly by self-fertilization. These he then crossed and so kept up his supply of plants of marketable value.

Lastly, what is it which enables flowers to change in the numerous ways mentioned above? First, we must acknowledge *Variability*, or the ability to vary in all organic beings. This is called into play by the direct action of changed conditions of life. Then we must recognize a *Directivity* in life which *responds* to the new influences. This it does by *directing* the physical lifeless forces in such a way as to move the physical lifeless matter derived from food, with which life then builds up cells, tissues, and organs for the definite purposes required respectively.

In the case of flowers we cannot say for certain which came first, adaptations for self-fertilization or for the agency of the wind. Gymnosperms seem to incline to the latter as the primeval condition, the flowers being of separate sexes.

If that be the case, the adaptations to insects have been acquired later, under the Directivity of Life.

Lastly, if flowers degenerate in the absence of insects or from other causes, they re-adapt themselves to secure self-fertilization, as in the case of cleistogamy, or else are pollinated by the wind, as in so many of the Incompletae.

How Life came to possess this Directivity, or, as Sir Oliver Lodge expresses it, to be a "Director of Forces," we know not, and apparently it is as scientifically undiscoverable as the Origin of Life itself.

GARDEN DESIGN. I.

By EDWARD WHITE.

[Read Nov. 4, 1913; MR. JOSEPH CHEAL in the chair.]

THE subject of garden design is concerned with so much detail, and involves opinions on so many matters affected by taste, that to-day we cannot do more than refer to a small proportion of the questions at issue.

During recent years there has been a marked development in the planning of English gardens, particularly of those of moderate extent. The large number of new residences with pleasure-grounds surrounding them have offered wide opportunities for experiment, and there has been a corresponding interest in the question of appropriate design. Indeed, it would be difficult to name any other artistic or intellectual recreation which has taken a greater hold upon the community in general. We have consequently become so familiar with the idea of beautiful gardens in this country that we are apt to take them as a matter of course. To appreciate the special advantages we enjoy one has only to travel in some of those countries in which the art of gardening is little developed. The sensation of journeying through hundreds of miles of inhabited country without seeing a single private garden in which there is any sign of ornamentation as an Englishman understands it, fills one with a feeling of pity for the people to whom the pleasure of gardening is apparently a closed book. In the United Kingdom the garden is a matter of the utmost importance in the scheme of an ideal country establishment. Such an establishment is a self-contained entity, usually the outcome of many years of affectionate attention from successive owners. The erections which cluster around the mansion, which is the heart of the scheme, are conveniently disposed, and the amenities include the gardens immediately about the house, a sheltered kitchen garden, glass-houses, an orchard, and other gardens which usually merge into the park lands. The mansion is dignified and conveys a sense of hospitality and comfort. We picture it as being framed by massive old trees which offer a guarantee of age, and create at the same time a feeling of unity by melting into more wooded scenery beyond. A placid sheet of water frequently adds peace to the picture, and the harmony is intensified by the extended pleasure-grounds and verdant lawns which serve as a link between the architectural lines of the terraces and the quiet restfulness of the landscape.

These are the characteristic features of a typical English country

establishment, the possession of which is the ultimate desire of most Englishmen.

In establishments of smaller pretensions the scale of the garden should naturally vary with the proportions of the house, for the sense of harmony is spoilt when the garden is too ambitious or too mean for the residence. It would be difficult to set a limit in acres upon the size of any garden in relation to a given house, for a good deal depends upon the method of its arrangement and something upon the surroundings. Happily the charm of a garden does not depend upon its size, for the smallest one is capable of the most enchanting transformation when skill is brought to bear upon its plan. Nevertheless it should not be forgotten that it is from the large places that the best ideas generally emanate, as they are the scenes of unceasing experiments in horticulture and artistic arrangement.

In the larger gardens the absorption of landscape scenery in the principal views is customary and plays a considerable part in our conception of an ideal garden, which is animated largely by sympathy with home landscape. Consequently a strong feeling for what is called nature is incorporated with and expresses itself in all gardens. No English garden-maker can hope for popular recognition unless he is thoroughly imbued with this sympathetic feeling and possesses the ability to give expression to it.

A love of nature is necessary for a complete understanding of the artistic side of gardening, and gardeners will always claim a foremost place among the declared lovers of nature, for their work continuously develops the power of finding attraction in effects to which others may be blind. Many of those subtle forms of nature, however, which possess allurement for the horticulturist may fail in the quality of beauty. Similarly the ability to practise horticulture, so necessary in the perfect garden, implies no special power to appreciate beauty, much less to create it. It is possible for a garden to contain every tree, shrub, and flower perfect of its kind, but it will be a failure from an artistic point of view unless the trees and plants are arranged in picturesque proportions. To be a work of art as we understand it, the parts of a garden must be arranged deliberately to produce pictorial effect.

Whatever difference of opinion there may be about details—and the form or style of a garden is a detail—the ideal garden will present the largest possible number of perfect pictures, and to satisfy this ideal condition it is necessary that every salient point of view should introduce a real picture, in which all that comes within vision unites to perfect the scene. Consequently the craftsman who aspires to make a garden in which "the excellencies of nature" are harmoniously united must have a clear knowledge of what actually constitutes a picture before he can feel sure of his ability to produce one. He must not trust to chance, nor rely upon the friendly aid of nature to cover his deficiencies. The mere capacity to recognize beauty is not sufficient. He must acquire a knowledge of the technique of picture-making. There is no way

FIG. 172.—CONNECTING LINK BETWEEN FORMAL AND INFORMAL GARDENS.
MORETON PADDOX.

[*To face p.* 560.

Fig. 173.—Japanese Garden at Gatton Park.

Fig. 174.—The Mount, Cookham.

Fig. 175. A Widened Ditch, Moreton Paddox

[To face p. 77

of obtaining such knowledge except by applying one's mind to the problems involved. It is the opinion of many that painted pictures are better subjects for such study than average garden scenes. One may be sure of the correct guidance of famous landscape painters, whereas perfectly composed garden pictures are extremely difficult to find. Study of the methods of composition and colouring of the best landscape artists will implant in one's mind many useful principles, of which instinctive use is made when engaged in the work of picture-making by actual garden practice. The following are a few of the lessons that may be acquired. One may learn something of the principles of connexion and how necessary it is to connect the different objects in a scene: how the parts in detail are treated to form a well-planned whole; how to hint at some concealed attraction without weakening the effect by premature disclosure; how buildings should be associated with and framed by the landscape. One may see how a real picture is divided into three points of distance, and appreciate the very great importance of showing clearly what is nearest; how necessary it is to give a definite meaning to every picture. One will learn the value of contrast; how to omit useless objects and how to group features which otherwise might have a scanty effect; and with practice to learn generally how to avoid tameness on the one hand and over-elaboration on the other. In one of the simplest of RUSKIN's works, "The Elements of Drawing," are given useful definitions of such qualities as unity, harmony, and sympathy, and easy explanations of the laws of repetition, continuity, radiation, contrast, &c., which, although written for the use of artist-students, will be found none the less valuable in teaching the garden designer something of the art of composition and help him to separate the good from the bad in any picture presented in the garden or elsewhere.

RUSKIN insists on the impossibility of laying down rules to ensure proper composition, and states that, although no one can invent by rule, there are simple laws of arrangement which it is well to understand, because, even if these cannot help one to produce a good picture, they may assist in one's work. In his definition of composition he says that "the first object is to secure unity," and the *best* mode of effecting this is to determine that one feature shall be more important than the rest, and that the others shall group with it in subordinate positions. This is a simple enough maxim, and one which could be applied with advantage to many present-day garden scenes. So many views, especially in what are called landscape gardens, are unnecessarily vapid in character for want of some feature which stands out distinctively; others—generally in symmetrical gardens—by reason of a fault which amounts to the same weakness. They contain too many important features of equal value which neutralize the effect of each other. Such ineffective scenes may often at a single stroke be transformed into a picture by the application of the principle quoted. In dealing with the law of repetition, RUSKIN remarks that "one of the pleasantest kinds of sympathy is when one group imitates

or repeats another; not in the way of balance or symmetry, but like a broken echo of it." The absence of this principle is the cause of the restlessness which disturbs so many garden scenes. "In landscape composition," he says, "the principle of balance is more or less carried out in proportion to the wish of the artist to express disciplined calmness. In bad composition, as in bad architecture, it is formal—a tree on one side answering a tree on the other; but in good composition, as in graceful statues, it is always easy and sometimes hardly traceable." It is advisable to note that this dictum refers to landscape only, and not to symmetrical gardens.

Space is found for these quotations to show that, from the teaching of RUSKIN, very valuable principles of art may be acquired which can be applied to garden-design. Whether he knew little or much of garden craft, his artistic instinct would have enabled him to solve many problems in design which puzzle an expert landscape gardener.

We desire by no means to ignore the necessity for a sound knowledge of horticulture as part of the equipment of a garden-designer; but in order to conceive a series of beautiful garden scenes both imagination and artistic skill are pre-eminently necessary. The Japanese appreciate this point very strongly, and it is commonly understood that their most important garden works are composed as pictures by accomplished painters as a preliminary to handing the design to a gardener for execution.

It cannot be denied that imagination directed from different angles of thought and the expression of unbiassed views on design have broadened the basis of the art and increased greatly its variety and interest. Landscape gardeners will do well to profit by the suggestions which come to them from divergent points of view. They should study the desire of the artist for a garden which satisfies the instinct for picturesque effect. They should recognize the anxiety of the architect for a sense of order and a feeling of unity between the house and the garden. They will naturally share the passion of the horticulturist for variety and an abundance of interesting and beautiful plants, and they may learn, moreover, to tolerate the restrictive common sense of the client whose privilege it is to provide the wherewithal, and will sympathize with his solicitude for the preservation of as many existing features as possible. The capable landscape gardener will skilfully combine and give a well-balanced value to each of these expressions of opinion, coming as they do from masters in their own department.

It is the ideal of an architect to adjust the plan of a house in such a way that no other structure could conceivably appear to be more appropriate to the situation. He desires to fit the materials and design to the purpose of the building, and to make them harmonize with the site and surroundings. The landscape gardener professes similar ideals, and will associate himself with this striving after harmony He also will try to plan his garden in such a way that no other treatment could be in truer sympathy with the house and more appropriate to

the site. The house and garden must, therefore, be considered as indivisible parts of one composition, towards which the architect and landscape gardener should work hand in hand. They must understand each other's proposals and the effects aimed at. The influence of the house is dominant. It is the *raison d'être* of the garden and the heart of the whole scheme. It usually occupies the centre of the most striking picture, it overlooks the fairest scene, and should be displayed in its most favourable aspects. The important purpose of a garden is to provide a setting in sympathy with such a house, and the style of the building must influence all garden features of an architectural character. The unity of the composition will be emphasized by the extension of the axial lines of the house into the garden, either in the form of main walks or by central vistas, and by every other expedient which will grasp the best features of the situation. The landscape gardener will be the more loyal servant of his art if he remembers that the garden is made for the house, and not the house for the garden. The house will always be placed in a way to take the best possible advantage of distant views, but some discretion in this respect is necessary. An important effect should not be made to rely too completely upon a vista likely to be spoiled in the future by building or other operations, otherwise, when the necessity arises for planting out anything objectionable, the proportions of the garden picture will be disturbed. In the arrangement of a vista care should be taken that the dominance of the main view should not be weakened by the opening of side vistas on such a scale as to compete with, and distract the eye from, the principal line of sight. Some persons make a fetish of their objection to the sight of any building whatever in the view beyond the garden, even at a great distance. There are many fine prospects enjoyable enough for their repose and freedom, which would be all the better from an artist's point of view if they contained some distinctive object which would serve to focus the picture.

Many writers on gardens from the architect's standpoint object to what they describe as the confusion of the garden with the landscape, and insist on the desirability of very definite boundaries, even though such boundaries may necessitate the drawing of a hard cross-line in a fashion which no painter would tolerate in the centre of one of his pictures. The idea of assimilation has been ridiculed in an otherwise admirable article on gardens by an architect, the writer suggesting that it is as foolish to make your wall-paper blend with your pictures as to combine gardens with landscape. It would be well to leave the matter at that point if nothing more effective could be said against it. A landscape gardener soon learns the danger of dogmatizing, but it will surely be conceded that the principle of gradation from the refinement of a made garden into the naturalism of surrounding woodland is one which offers a charm rarely given by the employment of a visible boundary wall, fence, or hedge, and my first endeavour would always be to make either form of boundary as inconspicuous as possible.

Naturally, however, a good deal depends on the form of the garden

and on what lies beyond, so that every case must be considered on its merits.

It is well known to how great an extent photography has increased interest in the pictorial effect of gardens. The utility of such pictures to landscape gardeners and garden owners is obvious. They offer some facilities, however, of doubtful benefit. For instance, it is not unusual for an amateur who intends to make a garden to collect all sorts of photographs of pleasing garden scenes, and to submit these to a designer with the idea of making them or their like the basis of a new garden. A garden designer of experience will know how to deal with such circumstances without offending his client or depressing his imagination by an attempt to make a puzzle of a series of scenes collected from alien sources. It should be remembered that such scenes generally owe much of their happy effect to their original surroundings, which cannot well be imitated, and this will explain why a borrowed design is rarely as effective in a new position as in the original one.

Moreover, the pleasing effect of many a garden photograph is due to some little technical touch which is entirely beyond the knowledge of anybody unversed in the wiles of an artistic photographer.

Sometimes exaggerated and none too clear language is employed concerning the development of what is called "the genius of a place." Undoubtedly most sites do possess, in addition to an inherent local character, some individuality which suggests a form of arrangement differing from that of any other garden, and it would be wise to develop these advantages before borrowing ideas elsewhere. Local characteristics are expressed by geological and climatic conditions to which witness is borne in the form of contours, the nature of soils, and the flora natural to a district. A garden should harmonize with local conditions, but it must express personal individuality if it is to be interesting. The most striking quality it possesses should therefore be looked for and developed.

It is difficult to particularize, but such features may be found in some special view, in the peculiar undulation of the ground, in some striking group of trees, in a piece of water, or other scene. If no suitable nucleus exists, then a character must be invented for the garden.

This calls for a special effort of the imagination on the part of the garden designer, for imagination is the life-force of all art. The art of garden design would degenerate if its practice were reduced to a formula and to the automatic adoption of a limited number of set ideas. Gardening has suffered from decay on more than one occasion during its history owing to the paralysis of imagination, but there is no fear of such a set-back when every new garden possesses a real individuality. It is to be hoped, therefore, that garden owners will insist upon the exercise of imagination in the landscape gardeners they employ, and will refuse to be satisfied with the reproduction of features which have been successfully designed for other situations.

One must not, however, be too insistent about the development

FIG. 176.—ENCLOSED GARDEN AT LANGLEY PARK.

[*To face p.* 564.

Fig. 177.—Garden at Crowborough.

of the genius of any site before it is quite certain that the said genius is well disposed towards horticulture. Such is no more necessarily the case than that the benevolence of Nature towards the desires of the garden designer can always be taken for granted. Left to herself, Nature will ruin any garden, and sometimes she will only give her assistance under conditions entirely opposite to those she exercises locally. For instance, the ruling spirit in many exposed sites is a lusty wind, which must be checked in its force before success can be hoped for. This may necessitate a form of garden entirely opposed to local conditions and in defiance of the genius of the place.

It has been said that the vitality of garden art springs from the continual exercise it affords for the imagination. Many people, nevertheless, expect to find in a standard work on garden design some written formula for the solution of every problem. Without decrying in any way the great value of existing garden literature, one can safely say that every garden which is to possess real character offers one problem at least which is peculiar to itself and must be solved on its own merits. Directly a master work is published which will teach everybody to make the most of every conceivable situation, the day of the landscape gardener will be over.

Imagination, however, will work more freely if all information that is available can be reduced to some serviceable order. One should therefore adopt systematic methods as far as possible and follow a logical sequence of ideas, either in the planning of a new garden or the re-modelling of an old one.

At the outset the temptation to make a place pretty should be postponed. Mere prettiness may always be applied to any well-conceived plan in a series of finishing touches. There are few places so badly planned that this is impossible.

Every problem should be solved ultimately on the basis of simple common sense.

Art has been defined as the acme of common sense, and, properly exercised, these respective aims will rarely come into conflict. Compromise will always play the principal part in the arrangement of every garden, even though it is necessary to adhere consistently to the principles to which most importance is attached. If side issues are permitted to gain precedence over original intentions, weakness and lack of individuality are a sure consequence. A garden that pretends to satisfy every critic is as little likely to succeed as an individual who attempts such an impossible task.

Before deciding upon the principles that are to be deemed decisive in any particular case, it is well to tabulate all the information available.

In the first place a plan is needed giving full information as to existing conditions on the site, and marking the position of all buildings erected or proposed, trees and other features, together with contours and levels.

If the house has already been built we shall assume that the position has been fixed by a process of compromise between the various claims

of aspect, elevation, distant views, local attractions, shelter, convenience of access, &c.

(1) We shall require plans and elevations of the house. These will show the position of all doors and windows of the living-rooms commanding views of the garden &c. as well as the domestic quarters.

(2) We shall proceed to mark on the plan the lines of view offering the most extensive and picturesque vistas.

(3) We shall take note of the existing features worth preservation, or which may offer a nucleus for further development, and shall look particularly for those characteristics likely to suggest some keynote of individuality.

(4) We shall observe those positions exposed to the wind and the situation of undesirable objects either on the site or beyond the boundary which must obviously be screened, as well as those of any outlying features which may some day be worth incorporating in an extension of the grounds.

(5) Observations will be made of the sunniest, the shadiest, and the least inviting spots, of the general lie of the ground, of the necessity for drainage, of the nature of soil and sub-soil, of the kinds of trees and shrubs which flourish locally, and other matters of similar nature.

(6) We shall consult our client in order to discover any special preferences as to the style of the garden, and settle upon such detailed features as are desired to be introduced, such as the number of tennis or croquet grounds, rose, rock, water gardens, herbaceous border, garden houses, &c., and we shall note any special likes or dislikes with regard to plants and flowers.

The suitability of any particular spot upon the site for the features determined upon will be considered.

(7) The dimensions required for the kitchen garden and the location of the glass-houses will require attention.

Inquiry will have to be made as to the time of year, if any, during which the owner is likely to be absent from the house, and the season at which the garden is required to be at its best.

Consideration will be given to the number of gardeners likely to be permanently employed in the upkeep of the gardens. This point does not always receive sufficient attention, although it is necessary not to make a garden too large for the staff to maintain.

In cases where there is to be a limit of expenditure on the gardens, the maximum cost will be a spectral figure constantly in view.

The considerations governing the selection of the site for a house need not concern us at present. The importance of the matter in relation to the garden is fairly obvious, and it becomes doubly evident when one commences to arrange the line of the carriage drive. The latter question is one which cannot be considered too carefully, as it generally influences the arrangement of the entire garden. Unfortunately it is too often settled as a separate detail, as if it were of no real importance to the garden design. In such cases it has generally been constructed by the architect and handed over to the landscape

gardener as an accomplished fact. This may be due to the anxiety of the former that his house shall be approached in such a manner as to give the best possible architectural effect. It is a very natural desire, but when the thoughts of the architect are centred upon the house, as they generally are, the opportunities for making the most of the intermediate ground may be neglected.

The expert garden designer will enter fully into the desire of the architect and will not forget that the house is the intended destination of the carriage drive. He will therefore take his inspiration from the building, and by appropriate treatment will try to prepare the mind of the visitor for the pretensions of the house.

Too often a carriage drive is treated as a piece of roadway of which the sole purpose is to connect the front door of the house with the main road. Dense shrubberies shut it in on both sides, through which the eyes of the visitor are unable to penetrate. This is often an unnecessary measure for the preservation of privacy, and many fine opportunities for interesting treatment are thrown away.

The carriage drive may be in reality the principal walk on the estate, so that every endeavour should be made to ensure its attractiveness to the owner and visitor alike.

Naturally no hard-and-fast rules can be laid down, and it is necessary to distinguish between the extent of different establishments.

In this respect there is a curious contrast between an approach to many a weather-beaten ancestral home lying in the heart of a beautiful old park, and the drive leading to a new mansion enclosed in smaller grounds which bear no such evidence of age. With the former there is generally a tradition to maintain a simplicity which is almost affectation. A narrow drive, in many places not more than 10 feet wide, runs modestly through a park filled with magnificent trees, and diverts its course only to find an easier gradient, or to avoid a monster oak or group of other aged trees. This is not an unusual kind of approach to the dull but serviceable forecourt of many fine old piles of masonry. The north side of such a home is generally kept carefully free from the bright colours of garden decoration, and embellished only with a few stone ornaments, time-worn and yellow with lichen. The front door looks out upon a stretch of park land in which deer may be seen browsing in the distance. All the fine gardens are on the sunny sides of the house. This rural simplicity, which never seems mean or paltry, is strictly in keeping with the traditions of the place, and has continued for centuries. On the other hand, very few new mansions possess sufficient maturity to enable them to emulate such dignified simplicity. This is especially the case when the ground through which the drive takes its way lacks the sympathetic association of an old park. Not only do these houses require more ostentatious carriage drives, but they often demand ambitious elaboration in their surroundings.

The lodge and entrance gates should be treated as part of the establishment and not as belonging to a main road. On this theory the lodge will be placed squarely with the carriage drive. This

practice will obviate the sudden turn which may otherwise be necessary when entering the gates; a quick change in direction at the outset is generally a mark of bad planning. The choice between a straight or curved drive naturally depends on several circumstances. It is influenced by the length of the drive, by the contours of the ground, by obstacles necessitating diversion, by some attraction worthy of notice, and most particularly by the angle of sight at which the house presents its most attractive features. When the distance is short, the ground comparatively level, and when one need not trouble about the forecourt being overlooked from the road, a straight drive is generally best. It often invites the planting of an avenue; but this temptation will be rejected when it involves cutting a picturesque ground in half and spoiling many good views. In circumstances differing from those named, a winding approach will generally be arranged, giving an early peep at the house for the purpose of putting one in tune with the surroundings, and breaking into full view at the point calculated to give the best architectural effect. There will be a slight rise towards the forecourt when possible. I do not care generally for the practice of making an avenue of a winding road, inasmuch as it may form a series of incomplete pictures. It is better that neither the forecourt nor the drive should abut on two sides of the house, as it limits the treatment of one garden front, and either interferes with privacy or necessitates inconvenient planting. If the drive crosses a main view from the house, it is often possible to sink it completely out of sight, as at Canons Park. The drive should approach the house by a route which appears to be the nearest practicable, and if an obvious diversion is made for the sake of picking up points of interest, the diversion must carry its own justification. For instance, at Cowdray Park it has been decided to make a main drive which first approaches the beautiful old ruins, for the purpose of obtaining the best view of them, and then it breaks away somewhat, in order to enter a majestic avenue of sweet chestnut trees. These attractions offer sufficient justification for a little addition to the length of the drive, already to be two miles long. At Heath Lodge also the nearest line to the house was rejected for several reasons. It was desired to use part of an existing avenue of chestnuts which would otherwise be wasted; to pass through a pleasant wooded preserve for a short distance; also to avoid the view of a range of glass-houses; and perhaps most important of all was the anxiety to approach a fine Renaissance mansion from the front instead of at an angle which would give a much inferior architectural effect. Such diversions are legitimate, and differ from the practice of wandering out of one's way for the purpose of giving a false idea of the extent of the grounds. Although I have referred specially to mansions in fine parks, the principles laid down are generally true and applicable to houses quite modest in scale with much shorter approach drives. It is frequently considered necessary to prepare an entirely different set of rules for the making of small gardens, but I consider that the inspiration

FIG. 178.—HERBACEOUS BORDERS AT CANONS PARK.

[To face p. 568.

Fig. 180.—Termination to Lower Terrace, Canons Park.

FIG. 181.—GARDEN SCENE AT GATTON PARK.

[*To face p.* 560

for the arrangement of such gardens arises so frequently from the methods in practice in large ones that an understanding of the principles in force in the latter is a good guide to follow.

Time will not permit me to prolong my remarks. I hope in a succeeding lecture to enter more intimately into details of garden arrangement, and it would be unsatisfactory to disconnect what I wish to say. I will therefore conclude by reading some delightfully satiric verses by KNIGHT, with reference to the particular question of an approach to the house. The lines were written one hundred and twenty years ago, but they contain the gist of the matter and offer several lessons quite worth remembering to-day :—

"When o'er the level lawn you chance to stray
Nature and taste direct the nearest way ;
But, when you traverse rough, uneven ground,
Consult your ease, and you will oft go round.
The best of rules are those of common use ;
Affected taste is but refined abuse.
First fix the points to which you wish to go,
Then let your easy road spontaneous flow
With no affected turn or wasteful bend
To lead you round still further from your end,
For, as the principle of taste is sense,
Whate'er is void of meaning gives offence ;
'But in your grand approach,' the critic cries,
'Magnificence requires some sacrifice.
As you advance unto the palace gate,
Each object should announce the owner's state,
His vast possessions and his wide domains,
His waving woods and rich unbounded plains.'
He, therefore, leads you many a tedious round
To show the extent of his employer's ground,
Climbs o'er the hills and to the vales descends,
Then mounts again through lawn that never ends.
But why not rather at the palace gate
Hang up the map of all my lord's estate ?
Than give the hungry visitors the pain
To wander o'er so many miles in vain.
For well we know this sacrifice is made
Not to his taste, but to his vain parade,
And all it does is but to show combined
His wealth in land and poverty in mind."

GARDEN DESIGN. II.

By Edward White.

[Read December 2, 1913; Mr. W. A. Bilney, J.P., in the chair.]

Notwithstanding the complexity of the subject of garden design, there is generally one issue which is quite simple. One may say that it is always desirable to arrange in a garden a few principal pictures which are commanded by the house, and to combine with them a number of secluded scenes of a specialized character, a condition being that the latter should not obstruct the breadth of the chief views.

In a former lecture I suggested that the instant attraction of a garden depends upon the skill with which these principal scenes have been composed, while the enduring charm of a garden depends upon variety and individuality, derived preferably from some character peculiar to the site. I urged that instead of adopting conventional ideas and methods simply because they had proved successful elsewhere, one should try to introduce, as far as possible, a note of distinct originality. If this view is accepted it follows that the continued endeavour of a landscape gardener should be to cultivate his own imagination and stimulate the same quality among his clients.

It is thousands of years since the charm of the ordered arrangement of flowers as an accessory to a building was first realized, but it is conceivable that there is no very great difference between the form of the first flower-garden and many that now exist. The originator of the idea would have been gratified if he could have foreseen its development through the ages, and interested in the controversies which have since been inseparable from the subject. We know that ever since printing was introduced the experts of successive generations have indulged in animated discussion on the question of garden planning, and it is an anomaly that, in spite of the peaceful virtues attributed to gardening, the principles of the art are sometimes debated with unnecessary acrimony. It is good to study all sides of a question, but it is desirable that conflicting opinions should be put one against another by the student of garden design, who should reserve his judgment until he has had sufficient experience to entitle him to take an independent view.

I refer particularly to the well-worn discussion concerning the respective merits of formal and informal gardens. It would appear that sufficient service has already been effected by argument. The tendency of much controversy has been to demonstrate the weak points in each form of gardening, and to lead to the gradual extinction of inartistic details. We know that there exist in this

country many beautiful specimens of each style which the boldest advocate of either type would hesitate to alter in favour of an arrangement more acceptable to himself, and from this we may infer that either form of construction may be right in the right place, and that the two systems are not necessarily in conflict. Personally I do not hesitate to advocate each form in the place to which I think it is best fitted.

Informal gardens are specially suited to a country such as our own, where the climate is so favourable to the luxuriant growth of grass and shrubs that the most satisfactory effects in landscape gardening can be obtained with comparative ease and economy. I will try later on to indicate a few positions in which one form or the other may be preferable, but it may first be worth while to define the root differences between the two styles and to understand what we mean by the words " formal " and " informal."

In some minds there is a tendency to associate the term " formal garden " only with complicated parterres and exaggerated architectural effects, but the definition I suggest gives a more liberal interpretation.

As I conceive a formal garden, it is one in which we frankly dispense with any direct guidance from Nature as to the kind of picture we produce. We allow her little or no voice in the shape of the garden which is intentionally artificial. Although formal gardening does not preclude the full development of trees and plants, the positions occupied by them are strictly defined, and their relation to each other is such as is not seen in natural planting, except by accident. Formality implies methodical arrangement, and generally carries with it a character of symmetry and regularity.

There is no reason why a formal garden should be lacking in picturesque qualities of a tender and appealing nature.

In the informal garden, on the other hand, we make a pretence of indulging Nature, but, in reality, we persuade her to assume a form of our own choosing. We do not profess to copy Nature, but freely accept hints from her. We select materials from our horticultural treasures and we arrange them in masses and groups which we know Nature can develop to the most picturesque advantage, because we have seen the effects produced in broad landscape, and particularly in the woodlands and glades. An informal garden, nevertheless, should bear evidence of care and attention, and an appearance of refinement in keeping with the house. Although the general shape of an informal garden will not be strictly symmetrical, there is no reason why detached features of regular shape should not be introduced into suitable positions.

Having said that either style may be right in the right place, it is but right to submit a further explanation of such a general statement. The standard test of suitability is that there should be complete unity between the house and the garden. Peculiar fitness to the site is equally necessary. No definite rules can be laid down, but there are certain conditions under which one style may be more appropriate,

since there are such wide differences between various types of architecture and the peculiarities of different garden sites. A classic mansion of regular design is obviously entitled to more dignified treatment of the ground in its vicinity than an irregular and picturesque house; it is also clear that steep slopes and flat ground cannot be dealt with in the same way. Hillsides invite the construction of level spaces in order that the garden may be comfortably enjoyed, and this necessitates a series of terraced areas, frequently sustained by semi-architectural devices. Flat sites require no such artificial support. These elementary examples illustrate the difficulty of applying one set of rules to the design of every garden.

An important purpose in planning a garden is to invest it with a marked character, and a distinctive quality is derived from difference of level. Subdivision also gives variety to an uninteresting site, and these two methods are particularly conducive to symmetrical treatment. When a site already possesses some striking natural characteristic, there is less reason for the alteration of its normal contours and connexion with the surroundings. When the distant view is of particular dominance, it is often unwise to weaken the effect by introducing comparatively petty garden details in the foreground. When there is no distant view or an uninteresting one, a formal garden can generally be employed to advantage. When the only view is a narrow vista on a central axis, a formal garden may also be arranged with satisfactory effect. A small site with no view beyond can usually be made interesting when treated formally, and its limitations can be concealed by subdivision. By clever treatment in the landscape style one may deceive at the first glance as to the size of a garden, but this is often at the expense of detailed interest.

Speaking generally, one may say that a formal garden can be justified when it does not entail the destruction of any existing trees or other natural features which give special distinction to a site; when the area is limited and enclosed; and when such a garden does not spoil the perspective of a view of commanding importance.

The reputation of informal gardens has scarcely been assisted by the substitution of the phrase "landscape garden." To many people's minds a "landscape garden" means a succession of paths, winding between clumps of planting situated without purpose upon stretches of grass artificially undulated. This conception of a landscape garden is not a modern one, for a century ago we find a poet complaining of effects which the maker of informal gardens to-day should try to avoid.

Knight expressed his sentiments in the following lines:

> "Curse on the shrubberies' insipid scenes
> Of tawdry fringe encircling vapid greens,
> Where incongruities so well unite
> That nothing can by accident be right,
> Thickets that neither shade nor shelter yield,
> Yet from the cooling breeze the senses shield,

FIG. 182.—GATTON PARK.

FIG. 183.—MARDEN PARK, SURREY.

[To face p 573

Prim gravel walks, through which we winding go,
In endless serpentines that nothing show,
Till tired I ask 'Why this eternal round?'
And the pert gardener says, ''Tis pleasure ground!'
'This pleasure ground!' astonished I exclaim;
'To me Moorfields as well deserve the name.'

. . . . . .

O waft me hence to some neglected vale
Where sheltered I may court the western gale,
And 'midst the glooms which native thickets shed
Hide from the noontide beams my aching head."

This is a fair criticism of a type of garden which has brought landscape gardening into disrepute and unpopularity. The informal gardens I advocate are not constructed on such principles.

The term "informal" does not mean that a garden informally arranged should be without form, for it is an elementary condition that it should be united harmoniously with the house; that is, that neither garden nor house should appear to be isolated, and that each should rely upon the other to give a sense of completion. The walls of the building should be firmly incorporated with a strong base, and the garden also should seem to derive its inception from the same source. This base is usually called the terrace, but it should be understood to consist not only of the raised part on which the house stands, but the whole foundation or setting of the building. The satisfactory effect of the terrace depends on the treatment of the lines of junction with the garden, whether they are terrace walls or grass slopes. They are the critical points of unity, and abrupt effects must be carefully avoided.

Most houses gain in dignity by a certain elevation above the garden, but a perched-up effect should be avoided. When this defect exists, it is generally due to the formation of a terrace on too mean and narrow a scale. The terrace should not be so broad as to cut off the view. If there is a difficulty in this respect, a comparatively narrow top terrace should be made with a wider one at a lower level. If the levels necessitate three terraces, the lowest should be the widest. A terrace path should end with some feature of interest which will serve as a point for a change of axis.

A good method of creating a sense of unity is to extend the axial lines of the house into the garden, so that from all the principal exits one looks directly into a vista picturing the heart of the garden. The house should also be framed attractively from a few points of view. The tour of the garden may be arranged so that one leaves the terrace from one end and rejoins it at the other, without retracing one's steps in the circuit.

If such a feature as a fine old tree or a group of trees could be associated with the terrace or with a path connected with the latter, a feeling of stability and permanency would be created. The framing of the house by trees, the use of climbing plants on the building, and

of shrubs at the point of connexion between terrace and garden, are valuable aids to harmony.

In the time at my disposal it would be hopeless to attempt to grapple seriously with the question of planning. I propose to say but a few words on one or two of the chief resources at the disposal of the garden designer. We all recognize the importance of a lawn as a factor in garden planning—a factor which unites and gives repose and stability to all parts. The texture of grass is so serviceable that it will carry the eye over a gap, like a sunk road, without any break in continuity. Beyond the garden boundary it will reappear on rising ground and serve again to connect the far distance and bring the entire prospect into harmony. It is not surprising that no substitute can be found to compete with grass as a foreground in garden landscape, and whenever one is in doubt as to what to do with the ground immediately in front of the house, no safer expedient could be adopted than to introduce green sward. Many gardens are spoilt by the notion that this situation calls necessarily for the planting of brightly coloured flowers.

The subject of planting requires a volume to itself for adequate treatment. It is the chief factor upon which the attraction of an informal garden depends. The placing of the right kinds of trees and shrubs in their right places is a matter of the first importance. In considering the question one must distinguish between planting for broad landscape effects and the finer and more delicate treatment required nearer home, although in each case the effects of balance and proportion are obtained by means of the proper combination of trees, shrubs, and grass. The great problem is to dispose grass and plants in such a way that from every salient point the exact limits of neither can be traced. The expanse of light on a lawn must be diversified by shadow. When the number of trees is excessive the light and shade effects are without sufficient breadth, and one must therefore try to establish an intricacy which is midway between uniformity and confusion. The site is sometimes so restricted that it offers opportunities for no more than one principal picture. In such a case one should concentrate upon the composition of this one picture as completely as possible, and not spoil it by attempting too much variety.

A landscape effect is always more satisfactory when it is based upon one dominating line of view, because scenes in which two or three vistas are competing for notice produce a distracting and confused result.

The positions of the chief masses of planting must first be settled. These can be decided more or less arbitrarily by the necessity for providing shelter from winds, and screening unsightly objects. Having determined the dimensions and outline of plantings required for purposes of utility, it is not difficult to settle the approximate positions of other large masses wanted to provide a rough balance

of composition about a fixed line of view. Small groups should be placed to connect the larger masses, and collections of trees and shrubs or single trees may be added where necessary to complete the appearance of continuity, as well as to produce the effect of intricacy and light and shade. Boundaries should not be planted continuously except for some necessary reason, as unbroken masses of foliage destroy the sense of space and liberty. Openings should be left to frame some distant object, such as a church spire, a bridge, a ruin or other feature. Many external objects, which scarcely occasion remark when one sees them in the open country, become almost treasured possessions when framed in a garden picture.

In determining the kinds of planting to be employed one must be guided by the texture, shape, and colour of the leaves, and by the size and habit of the tree. A quiet and restful effect will be obtained by planting large masses of the same kind of tree of unobtrusive shade and texture, as not only do they help to show up more conspicuous neighbouring trees, but the employment of a dominant note connects the whole of the planting and increases the feeling of unity.

Foliage of heavy and uniform texture makes the best background for other planting. A group of trees should generally consist of a larger proportion of such foliage than of the lighter and more feathery kinds. Dark and heavy greens should be used for groups in association with old buildings, and lighter shades where less serious treatment is required. Light and feathery trees are most suitable near water. The temptation to plant in a small garden a medley of single trees of the brightest colours that can be found should be resisted. There are so many trees of beautiful form and texture which have lovely flowers in the spring and exquisite tints in the autumn that there should be no question of using them rather than an excessive number of trees of brilliant foliage.

There are endless opportunities for study in the harmonious association of the leaves of trees, but it is almost impossible to give any governing rules.

The combination of foliage in colours which are rightly contrasted is generally more effective than that in which the shades are somewhat similar. Daring tints can frequently be harmonized by the introduction of a green or greyish hue and yielding habit. Foliage of the type of the sea-buckthorn will make peace between the colours of almost any two plants which are inclined to clash.

I should have liked to say something about the fascinating subject of flowering shrubs, and the infinite possibilities of their use, but that topic, I am afraid, is too wide-reaching to deal with now, so I regretfully pass it by.

It might be asked, in giving such dominant importance to the matter of trees and shrubs, where one should grow the flowers, upon which depend the gaiety and intimate pleasure of the garden.

Ample provision for flowers can be made, but it should be

remembered that the informal garden is generally more picturesque and inviting during winter than a formal garden, and if this advantage is to be retained the chief views should not be monopolized by the reservation of large areas for flowers, as these necessarily present a bare and desolate appearance in winter. Flower-gardens should be arranged in positions which appear to be subordinate to the planting. For these plenty of suitable situations can be utilized.

There are opportunities for symmetrical arrangements on the terrace, and borders can be made against terrace walls. Large masses of flowers may be arranged with shrubs in the background, the effect being particularly good where grass alleys wind between plantations bordered by flowers.

Flower-beds may be placed suitably at the intersection of paths. Special gardens—rose gardens, rock gardens, water gardens, and other similar features—may be constructed in sheltered, but not shady, parts of the grounds. Bulbs are most effective when planted in large numbers in grass and glades; the kitchen garden should have its flower borders, and if it is encompassed by walls or hedges there is often the chance of using the outside of these boundaries as a basis for some enclosed garden. The informal garden offers opportunities for the introduction of as many flowers as one could wish, and does not merely represent a collection of trees and shrubs, which, naturally, are not sufficient to satisfy most people's idea of a garden.

The majority of the large gardens in England can scarcely be described as either strictly formal or informal. The kind of garden recognized as distinctly English is perhaps expressed by a happy assimilation of all styles in a harmonious fashion.

The historical records of gardening deal mainly with different types of the formal garden. The most famous are perhaps to be found on the hillsides of Italy. They provide many lessons in imagination and architectural detail, and in bold treatment of various situations.

Another historical example of the formal garden which has exercised great influence, not only on the design of formal gardens in England, but on the history of English gardening, is that associated with the great French garden architect, Le Nôtre. The style he perfected came to grief in the hands of men of less imagination, and the tedium produced by constant repetition of design facilitated the great revolution of informal landscape gardeners in this country a century and a half ago.

Nevertheless, the design of many of the older formal gardens of Great Britain still shows traces of the style of Le Nôtre. The world-wide influence he must have exercised is evident in operations under my own control at the present moment, for I am dealing in three foreign countries with gardens of which the original design is attributed to him. The general principle of each of these gardens is

very familiar. The expenses of construction must have been enormous, and, considered from our present standpoint, one may wonder if the result was worth the outlay. The details are very intricate and ingenious, but they do not offer opportunities suited to the horticultural instincts of English gardeners of the present day.

I may instance the ground plan of the parterre at Drottningholm, the chief residence of the King of Sweden, which I have visited professionally during the last two summers. The original gardens remain in outline framed by the avenues as planted. These avenues consist of magnificent old limes, but unfortunately some are missing. The suggestion to cut down the whole of the trees remaining and to replant the avenues with young trees was referred to me. I feel sure that if I ventured to do such a thing in England I might as well retire from my profession. One can scarcely say that a lime tree is dead until it is cut down, as it has so much recuperative power. I therefore suggested that a quarter of the roots of these old trees should be pruned in successive years, that fresh soil should be added, and that vigorous young trees should be planted to fill up the gaps.

The question also arose as to the desirability of reinstating the details of the old plan. In view of the historical interest of the royal garden, which was to all intents and purposes a public park, I thought the idea was justifiable, and preferable to working out a new design.

In one of LE NÔTRE's gardens near Berlin, the main form was originally very similar to that of Drottningholm, but it has been much Germanized during the last century, and the only original feature which remains is the long central avenue, which extends for a distance of half a mile. The interior of the garden, when I first saw it, had been converted into thickets of trees and undergrowth, through which there were a large number of walks winding about in every direction, regardless of any definite plan. The best course appeared to be to make the most of the central picture on the line of the main avenue; to provide a strong terrace base as a line of junction between the house and the garden; to reduce the number of paths, and to give definite purpose to those retained; to cut up the woodland into a series of glades and vistas; to isolate some of the best single trees, and to form groups of others standing in grass.

It seemed hopeless to attempt to incorporate any flower-gardens with the landscape effects beyond the introduction of flowers suitable for woodland, so we made elsewhere a series of special flower-gardens, which were connected with the main terrace.

Another example of LE NÔTRE's gardens which I have visited is near Tours, in France. Here again the general plan is very much the same. The original avenues of limes exist and are very imposing. The château was built in the time of LOUIS XIV. A large moat was dug, but was never filled with water, for the reason—so I was informed—that the King wished to discourage the fortified strength of the castles of the day. We are now going to make rose-gardens in the moat. Elaborate

parterres were designed originally, but I do not think they were ever constructed. The ground is at present level, and, as long as records exist, has been nothing but a large lawn.

In this case I was asked to plan a garden somewhat on English lines, but appropriate to the position—a rather difficult matter, as the style of the château is characteristically French.

Designs of the type developed by LE NÔTRE have influenced for many years the formal gardens of England. Many places to this day contain specimens of his parterres on a more or less large scale, but for their full effect they require such immense areas of flat land that in many situations they would be impracticable, even if one wished to have them. They are dignified, and the avenues provide very fine effects, especially in the autumn, but the gardens are tedious, and one welcomes by contrast the composite construction of English gardens, in which there is less formality and more intimate feeling.

An interesting part of the work of a landscape gardener deals with the reformation of grounds of mature age, and presents a crucial test of his capacity.

In such operations he has not only to select existing features which are worth retention, need improvement, or deserve removal, as the case may be, but he must take care that all new work is in harmony with the best of the old, and particularly that his additions do not outbid the importance of the building. When the alterations assume a formal character there is a special tendency to fall into this error, with the result that the centre of attraction is wrongly shifted from the house to the garden.

Many places date from a period when horticultural details were banished to enclosures at some distance from the house, and the grounds were arranged chiefly to provide landscape effects and necessary shelter.

At the present day fully grown trees monopolize the sunlight, impoverish the soil, and occupy all spaces not required for vistas. On a bright day these conditions are attractive to the newcomer, but people who live with them often desire more interesting surroundings, and it is a difficult matter to provide them without spoiling the prevailing breadth and peace of the place.

In such circumstances the fact must be faced that the prevailing note is given by the large trees, and that the repose they afford cannot be enjoyed fully in an outlook which also presents the colour, vivacity, detailed interest, and possibly the seclusions sought for in a modern garden.

When one wishes to keep most of the trees the best course is to make new gardens, so to speak, *en suite* devoted to flowers in some convenient position clear of the chief views. These gardens should be connected by an important-looking path, with the terrace from which possibly one may arrange a glimpse of colour to indicate where the flower-gardens are to be found. Flowers can also be planted against backgrounds of shrubbery planting, and additional colour may be introduced by planting flowering trees.

In grounds of the kind described the effect of isolated flower-beds is rarely harmonious. When a house stands on ground even slightly raised, the construction of enclosed terrace gardens sometimes forms an interesting improvement, and the sacrifice of a few trees may be justifiable. Better still if they are so happily placed that one can work them into the plan.

The general failing of an old establishment is that in early days too much (or too little) respect was paid to badly placed trees, which in the end do not assist picturesque composition in spite of individual beauty.

How often a fine tree obstructs a good view! Half of a landscape gardener's work arises from differences of opinion on the question of removal. It is sometimes possible to satisfy each party to a controversy by removing a few branches to expose the view enhanced by the framework of the tree, otherwise the expert will be a very clever man if he succeeds in pleasing everybody.

A satisfactory effect is offered by a group of trees of which the stems are very close together, the branches combining to make one well-balanced head. It is less agreeable when trees are farther apart but so close that they spoil each other. One good tree is preferable to two badly grown, and the sacrifice of the weaker is always worth consideration.

Ill-directed zeal is responsible for the muddle into which many gardens have drifted. Almost invariably in places governed by no ordered plan, the day arrives when it is found necessary to try to pull things together into some coherent scheme. What is radically wrong calls for radical methods of remedy, and a firm handling of the plan is generally needful.

It is best to begin at the beginning—that is, with the drive and forecourt—and to correct such difficulties in dealing with the garden as arise from bad planning in this respect. The next point for attack is the terraces or ground surrounding the building, which should be established as a *pied-à-terre* preparatory to the reconstruction of the garden.

The evolution of a spirit of harmony in a place full of features interesting individually, but discordant as a whole, is a fascinating problem. The details in the garden worth retention should be well considered, and one should try to unify them in a logical manner, supplying such links as may be missing. The paths are the threads on which the ornaments are strung, and no path should exist which is unnecessary. I prefer to arrange one grand tour which takes one successively to all of the chief features of enjoyment without any retracing of steps. The items of interest in the garden should be well proportioned in relation to the length of the tour, and when this principle is observed it assists generally in preserving the balance of composition of the whole garden in the picture surveyed from the house.

Some of the most enjoyable work which falls within the province of a landscape gardener is associated with the renovation of an old

garden which contains a wealth of material ready to hand. Notwithstanding what I have said about radical methods of remedy being sometimes necessary, those who love their work will not approach it with a preconceived idea of turning everything topsy-turvey. The highest triumph of an artist is to evolve a beautiful thing with the least apparent effort and the greatest economy of material.

[The lecturer concluded by exhibiting several lantern slides and referring to the points they were intended to illustrate.

The illustrations of these lectures are from photographs taken by Mrs. FRANK MEAD, and, except figs. 176, 181–3, represent work carried out by the author.]

ON AFFORESTATION AND THE PLANTING OF FRUIT TREES IN THE DRY LANDS OF CHILE.

By Señor Salvador Izquierdo, S.M.C., F.R.H.S.

The climate of Chile possesses peculiarities worthy of study from the point of view of afforestation. The country forms a long and comparatively narrow strip of territory lying between the Andes and the Pacific Ocean, from the valley of Camarones, the northern frontier between Chile and Peru, to the southern or Patagonian extremity of South America. For this reason Chile possesses the most varied series of climates, commencing in the north, with its intense heat and tropical cultivation, to its extreme southern limit, where the climate is almost frigid.

The absence of rainfall is nearly absolute north of the city of Copiapó during the whole year, and rain is very rare in the winter season down to the province of Aconcagua. In the centre and south of the centre, rains are more regular during the winter, which is from May to September, giving an average of from 13 to 14 inches of water in the central region, in which the capital city of Santiago is situate. In the north, therefore, agriculture can only be carried on by means of irrigation with water taken from the rivers which come down from the Andes.

From the province of Talca, southwards, the winter rains are frequent and abundant, increasing in degree as one advances towards the south, reaching a maximum of 40 inches in the city of Valdivia, which may be considered to be in the region of virgin forest.

From the province of Concepcion, it is noticeable that the rains continue during the whole of the year; from Valdivia to the south the rains diminish down to the Straits of Magellan where water falls only in the form of snow.

With this slight idea of the character of the rainfall in Chile it will be understood that the planting of forests does not present any difficulty in the centre of the country, as there is always sufficient humidity for their growth. But the interesting part of the problem lies in the possibility of successful planting of the part of the country where rains do not fall except in winter, in which are included the land between the province Maule in the south and of Copiapó in the north.

In this section the length of the drought often reaches to eight months; notwithstanding this fact, there was in former times in this region of scarcity of rain a nearly impenetrable forest of large trees and undergrowth of many different shrubs, which grew and multiplied

naturally, without any human assistance. This forest, which has ceased to exist in the present day, is what by artificial means we now desire to replant.

The way in which we are working and the theory on which our work rests I will try to explain for the benefit of countries similarly situated, such as Australia, California, &c., which possess a climate and a rainfall not very unlike those of Chile.

Without doubt one of the most interesting problems which has been solved in Chile of late years has been the possibility of replanting with suitable forest and fruit trees not only the flat dry lands but also the principal mountain ranges situated round the valleys or on the coastal range.

This problem, which was of easy solution in the southern part of the country, where rain is abundant at all seasons, presented great difficulty and was long unsolved in the central and northern districts of the Republic, where the rainfall is confined to four or five months in the winter, and for the rest of the year the soil remains absolutely dry and in almost complete sterility.

From the first years of work in my trial grounds at "Santa Ines" my attention was called not only to the shrubs growing on the dry hills of Chile, but also to the existence of dwarfed specimens of other species of trees growing under the shelter of clumps of thorn. In such positions I found small plants of Maytenes (*Maytenus Boaria*), of Quillai (*Quillaja Saponaria*), and of many others. On the other hand history and tradition tell of the existence of large specimens and prove that there have been on the dry hills some kinds which now are extinct. And if, as must have been the case, all this vegetation had arisen spontaneously without the assistance of man, one can but conclude that what past centuries have done it is possible to repeat at the present time.

One cannot help also observing, in passing over the dry hillsides of different parts which are given over to the breeding of cattle, that it is difficult to find even small plants of any species of trees except where they are sheltered by other plants or protected by obstacles of various sorts, such as very precipitous hills or small patches of soil between inaccessible rocks &c. Therefore one arrives at the conclusion that one of the obstacles, if not the principal one, to the spontaneous increase of the trees must be the cattle, which when eating the grass also eat up the seedling trees growing amongst it, for formerly the number of cattle was much smaller than now, and at one time there were none. Trees could then grow without let or hindrance and formed large woods, which the Spanish discoverers and conquerors of Chile found in the country, and the disappearance of which we now so greatly lament without taking the trouble to replace them.

If one examines what takes place during the months of winter, when the dry soil of the hills is being moistened by the rains, one notices a curious fact, viz. the existence in July and August of small seedling trees of many different species close down on the soil and only

showing their seed leaves above the ground, which already possess a tap-root of perhaps one and a half to two inches long. Continuing the observation, in the month of September it will be seen that these same plants, with very little increase of growth above ground, possess a root of 4 to 6 inches, reaching 8 inches and even a foot by November and December. This peculiarity of the great and rapid growth of the root in comparison with the small advance of the stem shows the phenomenon which is produced in the birth of seeds on dry land. It appears that Nature is prepared for the difficulty that these plants are destined to experience in the long period of drought commencing in October. They exert themselves to insure life by placing their roots (being able to penetrate the moistened soil in winter) at depths where the moisture does not completely disappear, notwithstanding the great heat of summer in these places.

The data gained by these observations and by the examination of the seedling plants gave us an absolute certainty that the dry hills of Chile, which had only been considered of use during the few months of our winter and spring, could be re-afforested with valuable trees of various kinds, if treated by special methods. A great stimulus to us was the idea that we should be able to replace the Chilean trees of these dry regions, all of them of small growth, by the tall species of similar climates like those of Australia and California, which consist of genuine giants belonging principally to the families of Eucalyptus and Pine, the splendid growth of which has been shown on the irrigated hills of the country. With this idea we made experiments which have been crowned by the most perfect success; so much so that we can now prove that even the highest and steepest dry hills can be covered with valuable species of fruit and forest trees.

If holes are dug more or less deep in the period of the greatest drought of summer, and especially of autumn before the first rains, examination of the surface of the vegetable soil of the hills as well as of level lands in the hill country shows that the top layers are absolutely dry. At about 8 inches down the colour of the earth gradually begins to become darker on account of the traces of moisture which it possesses. This darkening in colour increases lower down until, at a depth of 14 to 16 inches, if you squeeze a handful of earth for a moment and let it fall, on opening the hand you notice a cool sensation, resulting from the evaporation of the trace of moisture which the earth has left upon the skin. It can therefore be established without doubt that even in the greatest drought of summer the soil of the arid hills possesses a certain palpable humidity at a depth of 14 to 16 inches. This fact, added to the peculiarity which the roots possess of penetrating downwards rapidly in the dry soil, has been the foundation on which we have established our system of this kind of planting; and the existence of certain species of trees capable of living in land more or less dry, having organs peculiarly adapted for the purpose, supplies the other necessary qualification for a good result. The depth to which the roots of the young trees

penetrate during the cold period enables them to resist the drought of the first summer after planting, and then, when the rains begin, the tree which had found itself with its vegetation in a state of all but complete rest, feeling the softened earth and moisture, fills up its veins, the leaves become vigorous and react upon the roots, which in June and July of the second year grow and spread considerably until the future growth of the tree is perfectly assured.

Having established these facts as to the necessary methods to adopt with this class of soil and lands subject to such periodic drought, our work naturally divides itself into two parts—the planting of forest trees and the planting of fruit orchards. These two classes differ greatly in the manner of treatment required; indeed, the number of fruit trees capable of being profitably grown is very small. The Almond, the Olive, and the Apricot are the only ones worth considering, but I propose to show that these three trees, of such great importance to Chile, possess peculiarities which enable them to be cultivated, without any irrigation, on our dry lands.

For plantations of forest and timber trees, as also for fruit trees, hills of lower height should be chosen in preference, as on them the layer of soil, although poor in quality, is of more or less depth and penetrable; and as far as possible land exposed to the south and east, which are the best exposures in Chile. As land of this description generally carries vegetation in the form of shrubs, it is better not to uproot them but only to cut them down, as their roots help to bind the earth and prevent its washing away. It is generally best to make these plantations on land which has been cleared of high woods, and after a crop of barley or wheat which has been sown on the ashes of the burnt branches, as is customary on all dry soils on the coast of Chile.

One proceeds to stake out the plots more or less widely separated from each other by wide rides in which there will be no trees. One then measures from the line of the rides with wooden rods, the length of which should be the same as that between the trees, namely 3 feet 3 inches, 4 feet 9 inches, or 6 feet 6 inches; and then mark the places in which the trees are to be set either by holes opened previously, or by hoe or mattock when once the earth has been moistened by the first rains. It is not necessary to be very strict in the direction of the lines or the distance between the trees, as a plantation would not be economical if one had to take out the butt of an old tree or to move large rocks if they happened to be in the way.

If this system of planting is adopted (without opening holes previously), when the soil is very light, it is generally necessary to plant small trees from beds, the roots of which are intact.

A boy walks with a bundle of young trees rolled up in a wet cloth immediately behind the man who carries the plan, and deposits a plant in the place where it should be planted by a second man, who makes a hole for it with the mattock, puts the plant upright in the hole with its root straight down, and presses the earth firmly round

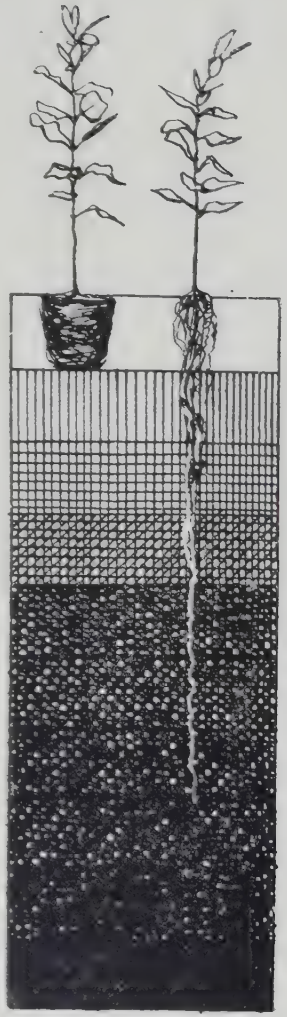


FIG. 184.

FIG. 185.

[To face p. 181

FIG 186.

Fig. 187

Fig. 188.

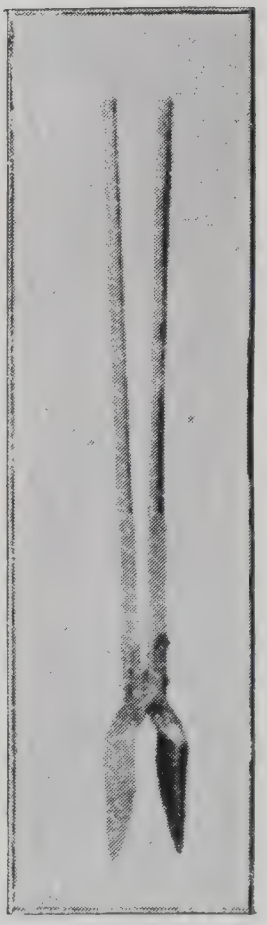


FIG. 189.

[*To face p.* 585.

the young plant. An indispensable condition for success is that the planting should be done early, at the beginning of winter.

If it is a matter of planting trees raised in pots, the holes should be made a little deeper than necessary, in order to leave the plant 4 to 6 inches below the surface level, so that the roots are underneath the very dry top spit in the dry season. This system of planting from pots in our test plantations on the coast of Melipilla has given very good results, very superior to the plantations of small plants from the seed-beds, which require a certain amount of care and skill on the part of the planter. In planting on hillsides, after pressing the earth round the plants, it is advisable to form a sort of cup, the lower edge of which is raised on account of the fall of the land. This cup serves to collect the winter rainfall, making it penetrate deeper. If this cup is covered with straw or leaves, the earth retains its moisture for a much longer time. Plantations should be entirely surrounded with wooden or wire fencing, as this is the only way to preserve them from being destroyed by animals. If at the time of planting the weather is unusually dry, it is necessary to water the trees by means of small carts or animals carrying the water; in general a couple of gallons of water is sufficient for each tree, and care must be taken that the water is poured into the cups. It is best to begin planting at the bottom of the hills, where there are usually streams of water and the soil is moister. If all the hillside cannot be planted in the same year it is convenient to plant them in horizontal portions from the bottom upwards. The young trees should not be taller than from 2 to 2½ feet, according to the kind; those that have given us the best result against drought are the following, in the order expressed:— Of the Eucalypti, *E. resinifera*, *E. robusta*, *E. Globulus*; of the Pines, *Pinus insignis*, *P. Pinaster*, and *P. canariensis*; of the Cypresses, *Cupressus macrocarpa* and *C. torulosa*; of the Acacias, *A. melanoxylon* and *A. dealbata*. The ordinary Acacia (*Robinia*) has not given good results, nor has *Pinus canariensis*, on account of its having a very long root, making it difficult to take up out of the seed-bed without breaking. It should be planted only from pots or in another way which we will describe later on.

The previous data refer, as we have said, to the planting of forest trees, principally evergreens, on dry lands. If 4 feet 9 inches is adopted as the distance apart, it gives about 7000 trees to a *caudra* (4 acres). With regard to planting fruit trees, if they can be helped by watering to make a good root start it is evident that 625 fruit trees to a *caudra* at about 16½ feet apart would be a more productive way of employing the necessary labour required for hand-watering than making plantations of forest trees, because in the first place we cover 4 acres and in the second 44 acres with the same amount of water. Hence we recommend planting the better class of soil with fruit, and the inferior with forest, trees.

Two reasons led me to experiment with a new process of planting forests on dry land by means of drawing out tree roots grown in

flower pots, the first being that I noticed how a plant in a pot produces its root ; and the second was the progressive increase of moisture noticed in dry soils as one goes down deeper. At the same time I was influenced by the difficulty of taking a plant up out of the seed-bed without hurting its roots or breaking them if they are long. If we shake out a conifer grown in a pot for nine months or a year, we notice that the principal root turns towards the side of the pot, and runs round and round till it reaches the bottom of the pot, when it pushes its way through the hole underneath and enters the ground ; the length of the root made in this manner is sometimes 20, 30, or even 40 inches long. If this plant, instead of being grown in a pot, had been transferred directly from the seed-bed to the hillside it would have been impossible to transplant it without cutting or partially destroying its root, as, instead of growing round and round as in the pot, it would have grown straight down into the earth. In the case of plants grown in pots it is quite possible to straighten out the root, provided it is done before it begins to form side roots. By this means the long unbroken root of the little tree goes straight down and can draw up the moisture it needs from the subsoil. If we suppose fig. 184 to represent a section of the soil, and we divide it into theoretical horizontal layers of 4 by 4 inches, we obtain a view of the facts on which the system of planting trees with long roots grown in pots is based. If we observe the position of the two plants in the figure it will be seen that the chances which a little tree, taken out of a pot with a mass of roots ready formed, has of growing are small, as the mass of roots is only 3 to 4 inches deep and could reach no other moisture than that which it finds in the layer of earth of the same depth, and which is precisely the first to dry up in the spring. Or, supposing the tree begins to strike its roots down before the moisture in the second layer of 4 inches immediately below it has evaporated, it still runs the risk of drying up in the first month of summer, entirely checking the young growth if, as is probable, it had not been able to penetrate into the third and fourth layers for moisture, and thus, even if not actually killed, the young tree's growth is retarded for two or three years.

On the other hand, if in fig. 184 the position attained by the same tree planted with its root drawn out be examined, it will be noticed that from the very first it is able all through the drought of summer to absorb the moisture of the deeper layers of soil, where a certain amount of dampness is never wanting, as I have said. The probabilities of success in this case are very much greater than in the former. And if we can give one or two waterings during the seven months of summer drought to plantations arranged on this system the losses will be hardly perceptible. After various experiments made I can confidently recommend this system for planting hillsides as long as due care is taken, not only as regards the growth of the root, but also in planting the tree and using well broken-up earth to fill in the hole. The manner of working is as follows:—In a wooden water-trough (about the size seen in fig. 185) you begin by taking out the tree

from the pot by holding it upside down and knocking the rim of the pot lightly on the edge of the trough. Then, taking the plant with both hands (as in fig. 185), dip it into the water, and with the points of the fingers and slight pressure the softened earth will be loosened from the roots and fall to the bottom of the trough, the smaller roots remaining in suspension.

When it is felt under the water that the roots are free from earth, move the plant to and fro, making it describe circles in the water. By this means it unwinds the curled-round roots and straightens them out (fig. 186). In *Pinus canariensis* I have found the roots as much as 4 feet in length, in *Eucalyptus colossea* 2 to 2½ feet, and in *Eucalyptus resinifera* and *Acacia melanoxylon* 1 foot 8 inches to 2 feet. (See figs. 187 and 188.) After making this interesting observation as regards the length of the root it is necessary to find a practical economical manner of opening such deep holes as these drawn-out roots require for planting them in the way already described. The North-American implement used for boring holes for fencing posts and a pointed spade answer the purpose excellently. The boring implement (fig. 189) has wooden handles which in opening close the teeth, and in closing open them. As these tools with teeth are of considerable weight, the thrust of them in the soft soil drives about half the length into the ground. In this form of tool the handles are opened with both hands, enclosing the earth in a cube, which is drawn out of the hole with the implement, and by repeating the process the hole increases in depth. The holes are opened with great speed after the rains, and in the experimental plots on this estate the labourers contract to make them at the rate of 2*s.* 6*d.* to 3*s.* 4*d.* for a thousand holes of 2 feet depth each. If it is a matter of still deeper holes the price would be 4*s.* 2*d.* to 5*s.* for the same number. The woods planted on this system have, notwithstanding the very dry years, maintained themselves and grown in splendid condition.

To secure good results with fruit trees special conditions are required which are not necessary for forest trees. It is not only desirable that fruit trees should take a normal course of growth and formation, but that they should also yield an annual produce which constitutes the real income and profit of such a plantation. Besides a fertile soil and suitability to grow in dry lands, the fruit tree must be able to find enough moisture to enable it to produce its flowers, to swell its fruit, make its growth, and ripen its crop before the extreme dryness of our summer and autumn commences in the hill lands of the coast. The rains in the centre of the country fall from April to October. Only fruit that ripens early is of any real use. Trees whose fruits have to grow with a very small amount of moisture in the soil and ripen only at the end of autumn are of little value. We can only recommend the Almond, Apricot, and Olive:—The Almond is a tree excellent for this class of plantation for the following reasons: (1) on account of its natural adaptation to drought; (2) its preference for a poor, stony soil; (3) the great value of the fruit in the market,

as it is of cheap and easy transport—a cart in hilly places, of dear freight, can carry 4,000 francs' worth, without shells; (4) the rapidity with which the fruit ripens; (5) the early age at which it comes into bearing—grafted trees produce almonds the second or third year.

This good result is easily explained, as the flowers open in the winter month of July under most favourable conditions, the roots finding all the moisture they require in that month, which is always a wet one in Chile.

The very great sweetness which its flowers possess makes them eagerly sought out by all kinds of insects, such as bees, thus insuring the setting of the fruit. The almonds grow in October and November under perfect conditions until they harden and ripen at the end of December and January, before the dryness of the soil has spoilt their quality; therefore, without watering, we are sure of a crop. It is true that the plant from January onwards shows signs of flagging in its leaves, but in the first two years it is assisted with hand-watering, and later on even such flagging does not hurt the tree at all, as the roots reach a moister stratum of earth. The fall of the leaf of the Almond planted on dry hillsides is a month or two earlier than on irrigated land, but this does not in the least affect the life of the plant, especially after it is three or four years old. A method which gives good results is, after the first rains of autumn, to sow almonds 16 to 20 feet apart, placing in each small hole five or six almonds, taking care that they are sound. In this way they soon start, and the roots grow rapidly. It is indispensable to give two or three waterings during the summer, and, as the fruit of these trees later on would be poor, it is as well to graft the second year with cuttings of the variety desired. Almonds like a southern or eastern aspect.

We recommend the Apricot to be grafted under the same conditions as the Almond. The object of cultivating in lands distant from any town is not for fresh fruit, which is difficult of transport, but for preserving them in the orchards themselves with utensils of very small value. A copper, as a bain-marie, and a small fireplace that will burn cheap wood fuel, and glass bottles or tins can be brought there, and everything done on the spot at small cost.

We do not hesitate to say that with the Olive hundreds of thousands of acres of poor land in the central valley of Chile could be utilized. The hardiness of this tree and its resistance to drought when well established are incredible. Assisted, like the other trees, with hand-watering during the first two years, deep roots are formed comparatively quickly. The introduction into the nurseries of Santa Ines of varieties suitable for making oil makes it possible to plant trees precocious in fruiting and producing crops which appear quite incredible. The specimen plants in the collection at Santa Ines produce every autumn twelve, fourteen, and sixteen thousand olives on trees which are not more than 10 to 12 feet in height. We therefore most earnestly advise the planting of the hills and rolling lands of the coast

of Chile with this tree for the purpose of manufacturing oil, of which the country consumes about 3 to 4 million francs' worth yearly, of which the fourth or fifth part only is olive oil, and the rest oil of mani, amapola, and cotton seed. The planting of Olive orchards is no hindrance to the use of the grass for sheep, because when once the trees are formed (at the end of four or five years in enclosed plantations) the trunks could be bound up or protected with wire on three or four stakes. This protection would not cost more than 6*d*. a tree, and would last many years. The sheep need only be cleared off during the harvesting of the crop.

The making of olive oil is a very simple industry, and does not require large capital; on the contrary, a mill, an oil press, and the necessary utensils would not cost more than 3,000, 4,000, or 5,000 francs, and, the produce being so valuable, the expense would be quite justified even if the capital had to be greater. This tree, which grows splendidly in dry lands, has the peculiarity that its roots penetrate sufficiently into the subsoil not only to assist the growth of the fruit but also for sustaining its ample evergreen foliage in a fresh condition.

In concluding this study, which we esteem of so great importance as regards dry lands, so abundant in Chile and elsewhere, we would like to draw attention to the fact that, proceeding with patience and care, any man undertaking it could make a fortune in a few years in view of the fact that land of this description can be purchased, in Chile at least, at the rate of 20 to 25 francs an acre. We have indeed the climate and the soil at our disposal; there remains only the man with a good will to work and become rich by means of patience and great care, such as we have just indicated.

NOTES ON THE FOREST TREES OF THE ATLANTIC COAST OF GALICIA AND ON THE FLORA AND VITICULTURE OF THE DISTRICT.

By A. Worsley, F.R.H.S.

The districts which I visited extend from near Bayona in the south along the coast to, and including, Arosa Bay in the north. This limited distance includes a long coast-line, for it comprises the bays, or sea lochs, of Vigo, Marin, and Arosa, together with various islands and the peninsula of Garve. Inland, I visited portions of the valley of the Rio Umia, about Cambados and Caldas de Reyes; the valley and ravines of the Rio Berdugo, and of other streams in the neighbourhood of Sotomayor, and the country immediately east of the Bay of Vigo.

All this country is mountainous, but none of it ascends to the 4000 feet level. The country rock is micaceous granite, with occasional outcrops of various metamorphosed rocks.

The rainfall on the lowlands of this district is about 36 inches, a very small part of which falls in the four summer months. Ground-frosts occur, but air-frosts are rare and slight, and are said to miss the Atlantic coast altogether.

The climate is mild and equable, but subject to violent winds. These are often associated with heavy falls of rain (*temporals*), and would certainly damage or uproot surface-rooting trees with heavy foliage. It is interesting to observe how the Eucalypti, evolved under totally different climatic conditions, are exactly suited to withstand these storms; for their deep roots give them a good anchorage into the rock, and their small and sparse foliage offers little resistance to the combination of rain and gale.* As a fact they thrive in this district far better than in their native country.

The incidence of forest areas is mainly governed by physical and economic conditions.

The upper zone consists of bare rock, with patches of soil here and there in the hollows. These tracts of upland cannot support timber, and are given over to gorse, various Ericaceous plants, grasses, and mosses. Early in September the mountains, viewed from a distance, were clothed in a garb of sombre brown, for the long summer drought was not yet broken; but, with the autumn rains, they soon became

* Some writers would ascribe all beneficial evolutionary processes to the laws of "Adaptation to prevailing conditions" and "Survival of the fittest," but in the above instance the *prima facie* view is that this fortunate accord with strange climatic conditions is due to good luck.

deep purple with flowering heaths. Much of these tracts is common land given over to grazing.*

The soil of the middle zone is usually shallow, and consists of decomposed granite and detritus washed down from the upper zone. This is occupied by a belt of *Pinus maritima*, which here attains a height of 30 to 40 feet. In some places *Eucalyptus Globulus* has been planted amongst the pines. The method of cultivation practised in this zone admits of this practice, for by the time that the pines are about 20 feet high there is both sufficient room between them and also enough head light for the interplanting of erect-growing trees such as the Eucalypti.

In its earlier stages of growth *Pinus maritima* is a bushy tree which does not admit of close planting. The branches, when they attain any length over 8 feet, become valuable as vine-props notwithstanding their perishable nature. Hence they are removed every few years, and the forest soon assumes a very open aspect, admitting of the interplanting of the Eucalypti. The pines, denuded of their lower branches, make straight and serviceable poles, and by the time they are felled the Eucalypti are already of at least the same height as the trees that are removed.

The soil of the lowest zone is generally rich and is given up to the cultivation of vines and maize, the latter being followed by grasses during the winter. The vine cultivation is generally bad, the ground is not kept clean beneath the vines, and mildew is much in evidence. Spraying is very carelessly and improperly carried out, such quantities of chemicals being used that the grapes often become absolutely poisonous, and the fruit and leaves are often visibly coated with copper sulphate.

The inhabitants always wash the bunches in water before eating the fruit, but, even after taking this precaution, cases of severe internal pains and acute illness following the consumption of grapes are too common.

The product of these vineyards in the form of wine has little to recommend it, for the *vin ordinaire* of the district is acid, vinegary, and of low alcoholic strength. Strangers will find that it is generally undrinkable by itself, and unpalatable even when mixed with water. At La Toja, on Arosa Bay, the *vin de l'établissement* was of fair quality, but La Toja was unique in this respect among the places I visited. Yet some progress has been made among the more progressive viniculturists of Northern Spain during the last two decades, and some of the best wines now approximate in character to the "Bourgeoise" wines of the Bordeaux district, although their strength is less.

* Goats are not allowed their freedom as is the case in Portugal. Hence the forest areas tend to increase wherever there is any soil. On the other hand, periodical fires reduce the area under forest. These fires are beneficial to graziers, for they are the only means for destroying the tangle of gorse which would soon cover all the pasturage.

No doubt, the heavy autumnal rains often damage the vintage in Galicia, but not to the same extent as the bad methods of cultivation in vogue in the district. The method of training the vines is that used in Italy, pergolas supported on granite pillars with wooden laterals being most approved. Espaliers are also much used in new vineyards, but I saw no fruiting vines grown as bushes. Summer pruning is not usually practised, and the maturation of the fruit is hindered by a vast tangle of foliage. This results in a large proportion of unripe bunches at the time of vintage, and is probably the main cause of the acidity of the Galician wines.

List of some Trees noted.

(a) as forest trees in the middle zone; (b) in groves or plantations in the lower zone; (c) in gardens only.

Abies Pinsapo (c).

Acacia sp. (b).—This is the same species which is common in gardens all down the Atlantic coasts of the peninsula and is said to be *A. dealbata*. It has been planted freely about Vigo.

Araucaria brasiliensis and *A. excelsa* (c).—The latter tree throws out its branches horizontally, those of the former incline upwards at an angle of 45° with the horizon. The former luxuriates, growing several feet yearly, and some trees not apparently more than twenty-five years old are already 50 to 60 feet high, and look like doubling this height. I have some doubt whether this tree is correctly named.

Araucaria imbricata (c).—The few individuals I saw were in good health, but not making rapid growth. However, I saw no dying or crippled trees such as linger in English gardens.

Cedrus atlantica and *C. Libani* (c).—I saw a few of these trees of medium size, but no young trees whatever. Yet those planted at Sotomayor thirty to forty years since are fine thriving trees.

Cryptomeria japonica (c).—Rare. Those I saw were about 40 feet high, and straight as a line, with every appearance of making fine timber. So well foliaged were they that they looked from a short distance like young Wellingtonias. One form was quite distinct from the type.

Cupressus Lawsoniana, *C. macrocarpa*, *C. funebris*, *C. lusitanica* (?).—In gardens only. Those planted at Sotomayor were all doing well and growing rapidly, but most of them looked as though they had been "garden slips" when planted, and not seedlings. Hence the Lawson Cypress grew like great bushes rather than trees. *C. funebris* and *C. lusitanica* (?) were making slender growth, but *C. macrocarpa* was doing well.

Eucalyptus Globulus and *E. obliqua* (a, b).—It is, perhaps, forty or forty-five years since *E. Globulus* was introduced into this district. On the estate of Señora Donna E. Lluria, Marquesa de Ayerbe, at Sotomayor, a few dozen trees were planted about forty years ago. These are now from 150 to 170 feet in height, and are the finest and

tallest Eucalypti that I have seen in Europe. The Atlantic coasts of the Iberian peninsula are evidently well suited to the growth of Eucalypti as timber trees. In the delta of the Tagus there are fine groves, many trees ranging over 100 feet in height, and some exceeding 120 feet. Yet I was surprised to find that a still greater growth had been made in a shorter time in the extreme north-west of the peninsula, where the temperature is many degrees lower, and the rainfall so much greater than in their native habitat. At Sotomayor some trees recently felled exceeded 50 metres (163 feet) in length as they lay. The wood is in great demand for flooring and constructive purposes generally, and although the boles are slender, yet the remarkable straightness of the trunks gives little waste under the saw. The wood, as grown in the peninsula, is reputed to maintain its first-class durable character notwithstanding its rapid growth.

Some fifteen or twenty years ago the Eucalypti at Sotomayor reached the fruiting stage, but it does not appear that the value of the tree for timber purposes was immediately recognized. It is at least evident that the general planting of Eucalypti did not take place until within the last decade, but since that time it has become general. It is noticeable that the foliage character of this genus changes greatly with age; in the case of *E. Globulus* the glaucous character of the young foliage is superseded by a sombre tone of grey, and the size, shape, and distribution of the leaves are profoundly modified. I was surprised to find, intermingled with the type of *E. Globulus*, many individuals possessing the foliage-characters of *E. obliqua*, and also the bark-peeling peculiarity of this latter species.

As to the rate of growth of these Eucalypti: to keep up a rate of growth of 4 feet a year for forty years and thus to reach a height of 150 to 170 feet, struck me as very remarkable in 42½ N. latitude. However, on examining the growth-rate of the seedling trees I was satisfied of the approximate correctness of the dates given me. Many seedlings barely two years old had already attained a height of 7 feet, and a few individuals had done their 4 feet a year in the first two years of their existence, and this in two cold and inclement years.

I noticed a fungoid disease in the bark of a few trees already large enough for felling; but it is quite likely that this is a saprophytic fungus, which only attacks the bark when it is already dead and ready to peel off. However, this fungus should be carefully studied, for there is a great prospective value in the Eucalyptus forests, and a large area of practically valueless land is open to afforestation in Galicia. Hence the health of these trees is of national importance.

Libocedrus sp. (c).—Presumably *L. chilensis*. Rare in gardens.

Pinus Laricio (c), *P. maritima* (syn. *P. Pinaster*) (a).—Perhaps the rainfall is greater than *P. Laricio* cares for. The specimens I saw looked healthy enough, but their growth was apparently slower than in parts of England. *P. maritima* suffers somewhat from the attacks of the pine weevil, but the trees are generally healthy and of stronger growth than on the Portuguese coast.

Platanus orientalis and *P. orientalis acerifolia* (b, c) have been extensively planted of recent years near towns as avenue trees and in groves, and also in gardens. In the latter place it certainly gives a good shade in a few years, but it is not in any sense a garden tree. The trees I saw were mostly 20 to 40 feet in height and doing well, but I think they will be uprooted by the winds as they grow taller.

Pseudotsuga Douglasii (c).—Rare, but making fine timber in the middle zone.

Quercus Robur (b).—Common on the shores of Arosa Bay, and in the lower valley of the Rio Umia. When these trees have reached a height of 9 to 12 feet they are unceremoniously decapitated. From near the crown they put out a few straggling boughs, and these are cut off in turn as soon as they are suitable for vine stakes. No doubt these stakes are durable, but very few are anything approaching straight, and one tree will not average more than a couple of usable stakes every seven or eight years. Hence these oak groves can scarcely be profitable, and they present, moreover, the most miserable appearance.

Sequoia sempervirens (b).—I only saw a few specimens at Sotomayor. These were already 60 feet high and flourishing.

Taxodium distichum (b).—Rare.

Thuja gigantea (b).—Fine trees about 60 feet high, but very few of them.

From a cursory examination of these forests, groves, and gardens it would appear that several valuable timber trees flourish in the climate of Galicia, but that no attempt has yet been made to grow any of them (with the solitary exception of the Eucalypti) on a commercial scale. Doubtless the trouble is that such trees cannot be obtained in Spain in the planting stage, and that the absurd *Phylloxera* restrictions make it very difficult and expensive to import them. The Eucalypt alone are so obtainable from the fact that seedlings in quantity spring up without any care or expense under the old trees planted forty years ago. Yet, from what I saw, it is quite clear that considerable areas could be afforested with the Californian Red Wood (*Sequoia sempervirens*), *Eucalyptus amygdalina*, and *E. marginata* * [Jarrah Wood], and would prove a source of great wealth.

Moreover, for the immediate necessities of the vineyards, there are many trees which would supply vine poles of a more suitable character and far quicker than *Pinus maritima* or the oaks.

* These trees grow freely from seed, and would presumably flourish on the Atlantic and Mediteranean coast wherever *E. Globulus* does well.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

XIX.—Leaf Blotch in the Potato 'President.'

By A. S. Horne, B.Sc., F.G.S., F.L.S.

In a former paper in this Journal I described as "Leaf Blotch"* a disease of the potato 'President' in Scottish crops grown from Continental seed tubers. It will be recalled that many of the plants in the field crop were dwarfed; the foliage curled, turned yellowish green, or yellow, and became blotched; and that these bad plants produced either very small tubers or none at all.

It is clear that a condition of this kind in a variety is one that needs urgent and careful study, since considerable loss might be experienced through using it—the greater the proportion of bad plants in a field crop, of course, the smaller the total yield and the smaller the return on the total outlay incurred for "seed" and labour. Accordingly investigations were at once commenced (1911). Tubers from good plants and bad plants respectively, obtained from Dunbar, were planted at the Chelsea Physic Garden and the South-Eastern Agricultural College, Wye, and it was found that not only did tubers from bad plants (always of small size) give rise without exception to bad plants, but tubers from good plants gave rise to a certain number of bad plants at both Chelsea and Wye. The bad plants at both Chelsea and Wye almost exactly resembled those I saw in the potato fields near Edinburgh and Dunbar, but the fungus, *Macrosporium solani*, which appeared on the foliage of the Scots plants was absent from those grown in the above-mentioned English localities. With the details of these earlier experiments the present Report is not concerned.

The first account of this pathological condition in the potato 'President' appeared in the Society's Journal, and the investigation has been continued at Wisley, since the problem promises to prove of exceptional interest and importance, and indeed gropes, as it were, at the very root of a great deal of what is known as potato disease.

The work carried out at Wisley includes:

(*a*) Experiments with seedlings raised from seed saved at Dunbar

(*b*) Experiments with tubers.

Whilst examining bad foliage obtained from Scotland in the autumn of 1910, indications of the activities of insects were discovered; accordingly, the writer, at that time engaged in research at the Imperial College of Science, South Kensington, sought the advice of Professor H. Maxwell-Lefroy, and succeeded in obtaining his co-operation with the object of attempting to determine the part played by insects

* Horne, A. S., "On Potato 'Leaf Blotch' and 'Leaf Curl'" (*Jour. R.H.S.* xxxvi. (1911), p. 618).

in damaging the foliage of potato plants or causing its ultimate disease and death. Experiments were at once commenced at the Physic Garden, Chelsea, and have since been continued at Wisley, but a description of these particular experiments and the results obtained must form the subject-matter of a separate communication. This Report deals entirely with experiments with tubers.

A.—*Experiments in the Garden.*

Planting sound tubers of suitable "seed" size (whole sets).

Season 1912.—It was deemed advisable first of all to try the effect of planting a plot of 'President' at Wisley in order to see how the plants produced compared with those grown on the plots at Chelsea and Wye in 1911. Accordingly 1 cwt. of 'President' was purchased from a potato merchant, who stated that they had been raised at Dunbar in 1911. These potatos were planted in light sandy soil at Wisley after it had been treated with a little artificial manure.

The result obtained was much worse than that experienced at Chelsea and Wye, and quite as bad as the more serious cases observed in Scotland in 1910. The pathological condition became evident in a large proportion of plants before flowering time. These plants were dwarfed and had folded and blotched leaves, often tinged with a yellowish or pinkish colour just as in the case of the Scots plants (figs. 190, 191, 195, 196). At Wisley, although the plants flowered (both good and bad), very few set seed, whereas in Scotland a large proportion (both good and bad) formed seed bolls.

The condition of the plot in August is shown in the plan on the opposite page, which represents every plant grown and its actual position.

Upon lifting, the produce from the blotched plants proved to be extremely small. Each plant produced two or three small tubers similar to those shown in the photograph of tubers from bad plants grown at Wye (fig. 193). The crop as a whole was poor and of little value.

Season 1913.—Tubers from the 1912 crop were saved and planted again at Wisley in 1913, near the site of last season's plot, and a precisely similar result was obtained. On October 10, when the tubers were lifted, the foliage of a few blotched plants was still standing. These plants were lifted and bore two or three small tubers each. The foliage of the more healthy plants had died down, and at these places the tubers were more numerous and larger, but the yield on the whole was very poor.

B.—*Variability in Tuber Characters.*

By special request a grower in Scotland selected about 200 tubers that he judged to be suitable for "seed" from the 1911 crop of 'President,' and forwarded them to Wisley for experimental purposes. On January 15, 1912, the writer re-selected 51 of the very best of the grower's choice and very carefully examined each tuber. The number

FIG. 190.—FOLIAGE OF POTATO 'PRESIDENT' SHOWING BLOTCHES.

[*To face p.* 596

FIG. 191.—FOLIAGE OF POTATO 'PRESIDENT' WITH DEAD ENDS AND SMALL PERFORATIONS.

of eyes, the form of eye, the number, situation, and grouping of the sprouts, the condition of the skin and the texture of the tuber were noted, and are recorded in TABLE I. *a* (Nos. 1 to 51). A second selection was then made from the original sending (TABLE I. *b*, Nos.

PLAN OF FIELD EXPERIMENT, 1912, SHOWING THE CONDITION OF THE CROP IN AUGUST.

Row \ Plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	G	G	B	G		G	G	G	G	B	G	B	B		G		G	G	G	G	G	G	G	G
2		G	B	B	B	G	B		B	B	B	G	G	B	B		B	G		G		G	G	G
3	G	B		G		B		G	B	B	G	G	G	B		B		G	B	G		G		G
4	B			B		B		G	B	G		B		B	B		B	B	G	B	B	B		B
5	B	G		B	G			G	G	B		G		G	B			G		G	B	G	B	G
6		G		G		G		B		G	G	B	B			G	B	G	B		B	G		G
7		G	G	G	B	G	B				G		G	G	B	G		G		G	G	G	B	
8			B	G		G						G	G	G				B	G	G		G	B	G
9		B	G	G		G		G	B	B	G	G			G		B		G		B			B
10	B		G	G	B	G	G	G	B	B	G	G	B	G	G	G	G			G			G	G
11	G	G		G	G	G	G	B		B	G		G	B	G	G		B	G	G		B		G
12		B			B	G	B	G	B	G	B	B	B	B	G	B	B	G	B	G	G		G	B
13		B		G	B	G		G	B	G		B		B	B	G	B	G	B	G		G		G
14		G	B	G		G	B	G	B		B	G	G		B	G	G	B	B			B	B	B
15	B	G	G	G	B		G		G	G			B	G		G	G	B			B		G	G
16		G	G	B			G	B	G	G		G	G	B		G	G	G	G	B	B	G	B	G
17	G	B	B	G	G			G		G	B	G	G		G	G	B	B	G	G	B	B		G
18	B	B	G	G	G		B	B	G	G	G	G		G		G		G		B	B	B	G	G
19	B		B	G	B		G	G	G	G		B	G	G	B	B		G		B	B		G	B
20		G		G	B	G	B			B	B	G	G		B	B		B	G		G	B	G	G
21	B	B	G	B	B	G	G	G		G	G	B	G	G	B	B		G	B		B		B	G
22		B		B	G	G	G	B	B	G		G			G	G	G	B	B	G		G		
23		G	G	G	G	B		G	B	B	B		G	B	G			G	B	G	G	G	G	G
24				G	G	G	B	G			G	G		G	G	G	G		G	B	B	G		G
25	B	G	G	B	G			G	G	B	G	B	B	B	G	B	G	G	B	B			G	G
26			B			G	B	G		G	G	G	B	G		G	G	B	G	G	G		B	B
27	B		G		G	B	G			G		B	B	G	G		G			B	G			G
28				B	B	G	B	G	G	G	G	G	G	B	G			G		G	G		G	
29	B	G	B	G	B	G	G	G	G	B		G			G	B	B	G	B	B	G		G	G
30	G	B		G			B	G	G	B		B	B		B	G	G	B		B	G		G	G
31		G	B	B	B	G	G	G		B	B	B	B		G	G		G	B		G	G	G	G
32	G	G	G	G	B	B	G			B		B			G	G	G	G	B	G	G		G	G
33	B	B	B	B	B				B		B	B		G		B			B	B	B			B
34	B	B		B	B		B	B		B	B	B		B	B	B	B		B	B			B	B
35	G	B	G	B	B		G	B	B	B	B	G	G	G	B	G	B	B	B	B	B	G	B	G
36	B		B	B	B	G	B	B	G	B														

G = good plant. B = bad plant. A blank square indicates that the haulm was dead or that the tuber had failed to develop.

52 to 69), and in this lot none of the tubers had sprouted when received. The remaining tubers (TABLE I. *c*, Nos. 70 to 78) were enclosed in a separate parcel by the sender for investigation because they were so exceedingly soft and flabby.

TABLE I.—SHOWING VARIABILITY IN THE TUBER OF THE POTATO 'PRESIDENT AFTER SELECTION AS SUITABLE FOR "SEED."

Tuber number	Weight in grammes	Number of eyes	Eyes shallow or deep	Grouping of sprouts	Sprouts injured or not	Number of sprouts removed	Situation of sprout left	Skin smooth or rough	Skin injured or not	Texture of the tuber
				(a) Tubers sprouted when received.						
1	51	8	t m l s	t si ...	—	0	t	m	—	f
2	53	6	t m l m	t gr l si	—	2	t	r	+	m
3	49	7	t m l m	... l si	+	0	l	m	—	f
4	58	7	t m l m	... l si	—	1	l	sm	—	f
5	46	7	t m l m	... l si	—	0	l	r	+	f
6	44	7	t m l m	... l si	—	0	l	sm	—	f
7	72	7	t m l m	... l si	—	1	l	r	—	m
8	63	7	t m l m	t si l si	—	1	t	m	—	f
9	45	8	t s l s	l si ...	—	0	t	sm	—	f
10	62	7	t m l m	t si ...	—	0	t	r	+	f
11	65	7	... l s	t gr ...	—	2	t	m	+	m
12	58	6	t d l m	t si ...	—	0	t	r	—	m
13	58	7	t m l m	t gr l si	—	2	t	m	+	m
14	74	8	t d l m	t gr ...	+	1	t	m	+	f
15	52	7	t m l m	t si ...	—	0	t	sm	+	f
16	69	8	t m l m	t si ...	—	0	t	r	+	m
17	55	9	t s l s	t gr l si	—	2	t	sm	—	f
18	43	6	t m l m	t si ...	—	0	t	sm	—	f
19	70	7	t m l m	t si l si	—	1	t	r	+	so
20	75	9	t m l m	t si l si	+	3	t	sm	+	f
21	85	7	t d l m	t si l si	+	1	t	sm	+	f
22	55	6	t m l m	t si ...	—	0	t	sm	+	f
23	65	7	t m l m	t gr l si	+	3	t	m	+	m
24	56	7	t s l s	... l si	—	1	l	m	—	m
25	71	6	... l s	... l si	+	4	l	sm	+	m
26	76	6	t m l m	t gr ...	—	1	t	m	—	m
27	61	7	t m l m	... ...	—	0	t	r	—	m
28	40	6	t m l m	... ...	—	0	t	r	—	so
29	65	5	t m l m	... ...	—	1	l	r	+	m
30	62	7	t m l m	... ...	—	0	t	m	+	f
31	46	7	t m l m	... ...	—	1	l	m	—	f
32	41	6	t m l m	... ...	—	0	l	m	—	m
33	50	6	t m l m	... ...	—	0	l	m	—	m
34	53	2	... l m	... ...	—	1	l	sm	—	f
35	72	8	t m l m	... ...	—	1	t	r	—	m
36	62	5	... l s	... ...	—	0	l	r	+	m
37	38	3	... l m	... ...	—	0	l	r	+	so
38	75	7	t m l m	... ...	—	1	l	r	—	so
39	60	7	t m l m	... ...	—	0	t	m	—	f
40	58	6	t s l m	... ...	—	0	t	r	+	m
41	66	7	t m l m	... ...	—	0	l	r	—	m
42	58	7	t m l m	... ...	...	...	...	m	+	f
43	46	6	t m l m	... ...	...	...	...	r	—	m
44	82	7	t m l s	... ...	...	...	...	m	—	m
45	63	8	t m l s	... ...	...	...	...	r	+	so
46	66	8	t s l s	... ...	...	...	...	r	—	f
47	54	6	t m l s	... ...	...	...	...	r	—	m
48	47	7	t m l m	... ...	...	...	...	r	+	so
49	42	7	t m l m	... ...	...	...	...	r	+	m
50	70	7	t s l s	... ...	...	...	...	m	—	m
51	59	7	t m l m	... ...	...	...	...	r	—	so

Tuber number	Weight in grammes	Number of eyes	Eyes shallow or deep	Grouping of sprouts	Sprouts injured or not	Number of sprouts removed	Situation of sprout left	Skin smooth or rough	Skin injured or not	Texture of the tuber
				(*b*) *Tubers not sprouted.*						
52	72	6	t m l m	... l si	+	...	...	m	+	m
53	60	7	t m l m	... l si	+	2	l	m	+	m
54	56	7	t m l m	t si ...	+	0	t	sm	+	m
55	72	8	t m l m	t si ...	+	0	t	m	—	f
56	54	13	t m l d	t si ...	+	0	t	m	+	m
57	83	7	t m l d	t gr l si	+	7	t	r	—	m
58	57	5	t m l m	t si ...	—	0	t	r	+	so
59	40	4	t m l m	t si ...	—	0	t	r	+	m
60	46	6	t m l m	t si ...	—	0	t	r	+	m
61	51	7	t s l s	... l si	—	0	t	r	+	so
62	40	7	t m l m	... l si	—	3	l	m	+	so
63	35	5	t m l s	t si l si	—	1	t	r	+	m
64	50	7	t s l m	... l si	—	1	l	r	+	m
65	55	7	t m l m	... l si	+	1	l	sm	+	f
66	40	6	t m l m	t si ...	—	0	t	r	+	m
67	80	8	t d l d	t gr l si	+	6	t	m	+	f
68	52	2	... l s	... l si	—	0	l	m	+	m
69	43	3	... l m	... l si	+	2	l	m	+	m
				(*c*) *Soft tubers.*						
70	80	8	t d l m	t si l si	+	1	t	m	+	m
71	84	7	t d l m	t gr l si	+	7	...	m	—	so
72	70	7	t m l m	t gr l si	+	3	...	m	—	so
73	74	6	t d l d	t si ...	+	0	t	m	+	m
74	63	8	t m l m	t gr l gr	+	8	...	sm	+	so
75	51	8	t m l d	t si l si	+	3	...	sm	+	so
76	98	8	t d l d	t gr l gr	+	9	...	sm	+	so
77	72	9	t m l m	t gr l si	+	8	...	sm	+	so
78	72	8	t m l m	... l si	—	1	l	r	+	f

d = deep f = firm gr = groups l = lateral m = medium r = rough
s = shallow si = single sm = smooth so = soft t = terminal
+ = injured — = not injured.

Numbers printed in heavy type indicate that the tubers in question produced bad plants.

From this TABLE it is evident that the tubers are very variable. The eyes vary from very shallow and superficial to very deep. This is well shown by fig. 192 E (tuber 17, Table I.) and fig. 192 B (tuber 21, Table I.). The occurrence of sprouts singly and in groups is illustrated by fig. 192 D (tuber 12) and fig. 192 C (tuber 76, Table I.) respectively. The skin varies from quite smooth to very rough—see fig. 192 B (tuber 21) and fig. 192 A (tuber 2) or fig. 192 D (tuber 12, Table I. *a*). The tubers themselves may be quite firm or very flabby, as in fig. 192 B (tuber 21) and fig. 192 C (tuber 76) respectively; in fig. C the skin is wrinkled owing to flabbiness.

It is quite impossible, of course, to tabulate all the characters in a Report of this kind. The tuber weight is given as an index of general uniformity of size, but the shape, which is variable, is not given. The eyes vary, of course, in other characters than depth. They may be more or less circular, triangular, or elliptical in

outline; concave or convex; the eyes on one tuber may be all alike or of different kinds both with regard to depth and shape, &c. Fig. 192 C of tuber 76 shows both a deep and a convex eye; figs. 192 B and E of tubers 21 and 17 show deep triangular and shallow round eyes respectively.

The second point that stands out clearly is that none of the above-mentioned characters are in any way related or paired. Thus the depth or shallowness of the eye does not occur specially associated with any other character as shown by the following table, and there is likewise no correlation between the kind of skin and the texture of the tuber.

TABLE II.

Deep eyes.						Shallow eyes.					
Tuber number	Weight in grammes	Number of eyes	Grouping of sprouts	Skin smooth or rough	Texture of the tuber	Tuber number	Weight in grammes	Number of eyes	Grouping of sprouts	Skin smooth or rough	Texture of the tuber
12	58	6	t si ...	r	m	1	51	8	t si ...	m	f
14	74	8	t gr ...	m	f	9	45	8	t si ...	sm	f
21	85	6	t si l si	sm	f	11	65	7	t gr ...	m	m
70	80	8	t si l si	m	m	17	55	9	t gr l si	sm	f
71	84	7	t gr l si	m	so	24	56	7	... l si	m	m
73	74	6	t si ...	m	m	40	58	6	... ...	r	m
76	98	8	t gr l gr	sm	so	50	70	7	... ...	m	m
67	80	8	t gr l si	m	f	61	51	7	... l si	r	so

f = firm gr = groups l = lateral m = medium r = rough si = single
sm = smooth so = soft t = terminal

C.—*Relation of Seed Tuber-size to Leaf-blotch.*

Experiments were made to determine whether the occurrence of bad plants was in any way dependent upon the size and weight of the tubers planted.

The tubers used in this experiment were selected from those sent to Wisley by Professor E. S. SALMON, in 1911, from Wye, in connexion with the writer's earlier experiments. In all, five lots of three tubers each were chosen in order of weight and the characters of the tubers were recorded (see Table III. and fig. 194) as in Table I. The tubers were planted in pots on February 7, using Wisley garden soil.

Sprouts had appeared above the soil by February 28 from all the tubes except 1, 3, 6, 7 and 10 (Table III.), but showed no symptoms of yellowness, although this character had appeared in the other experiments. Toward the end of March, however, the plants grown from the smaller tubers began to show unhealthy symptoms, which developed during April. In the absence of any visible cause, the foliage became yellowish, the leaflets curled with the under surface exposed to view, the ends of the leaflets turned pink, then brown, and finally died, whilst the leaves became variously blotched. The foliage then exactly

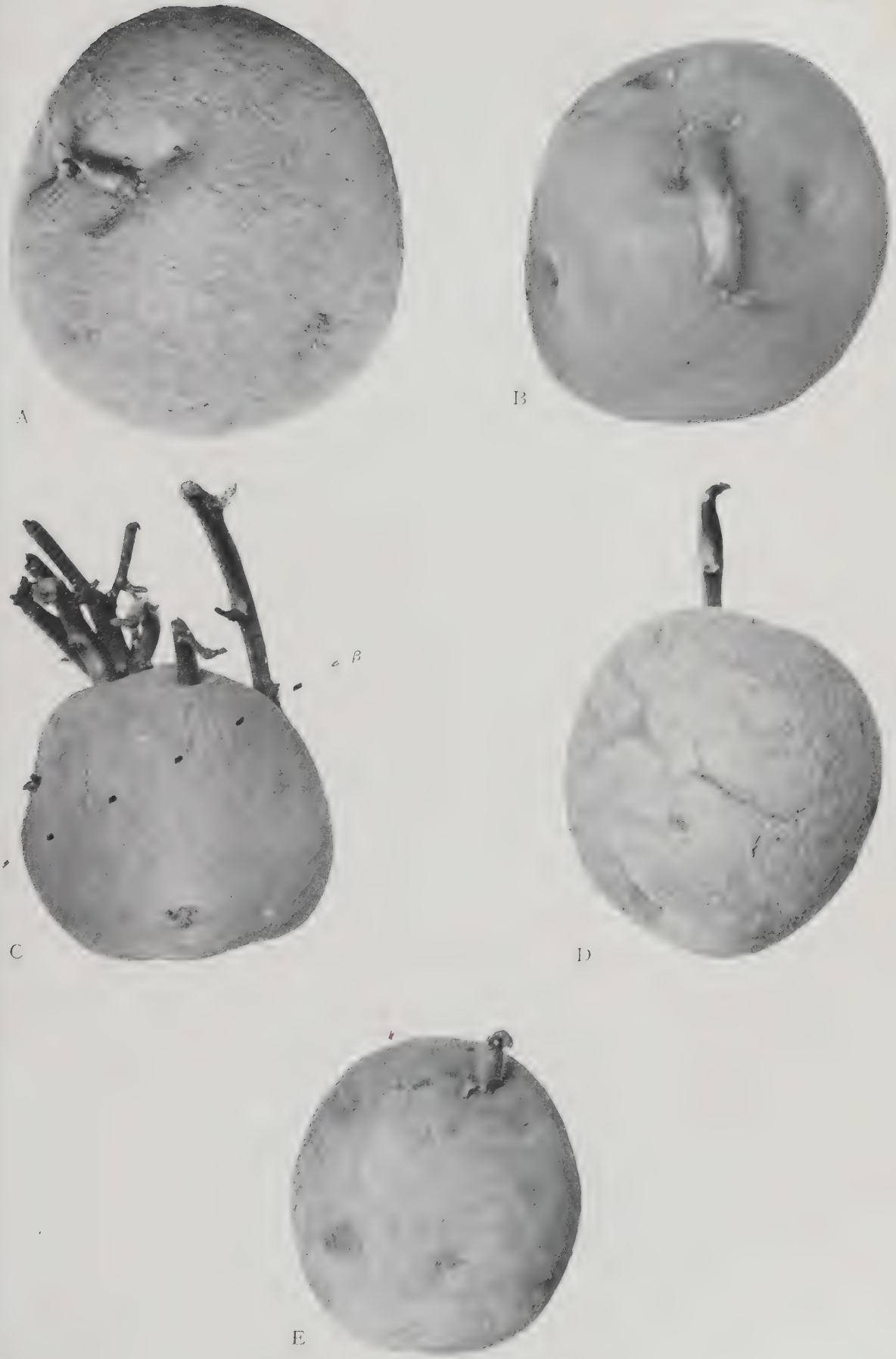


FIG. 192.—TUBERS DESCRIBED IN TABLE I.
A, No. 2; B, No. 21; C, No. 76; D, No. 12; E, No. 17.

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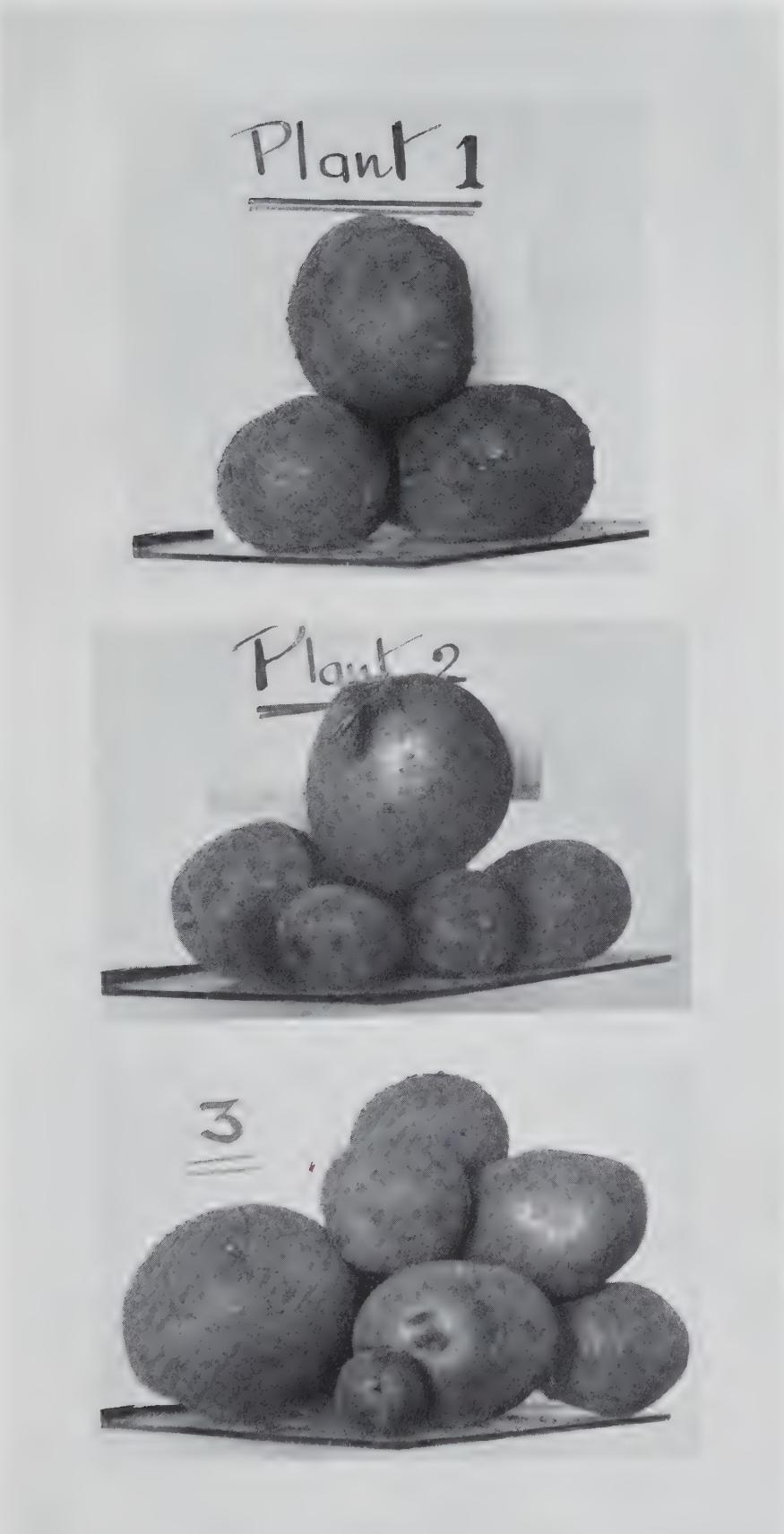


FIG. 193.—TOTAL YIELD FROM 'BAD' PLANTS GROWN FROM SOUND TUBERS AT WYE, 1911.

TABLE III. SHOWING THE CHARACTERS OF TUBERS PLANTED IN POTS IN ORDER OF WEIGHT AND SIZE.

	Tuber number	Weight in grammes	Number of eyes	Eyes shallow or deep	Grouping of sprouts	Sprouts injured or not	Number of sprouts removed	Situation of sprout left	Skin smooth or rough	Skin injured or not	Texture of the tuber	
Lot 1	1	202	10	t m l s	... l si	—	3	l	r	+	m	
	2	190	11	t m l s	t si l si	—	3	t	r	+	m	
	3	198	9	t m l s	... l si	—	3	l	r	+	m	
Lot 2	4	85	10	t m l m	... ...	—	1	...	r	—	f	
	5	83	5	t m l m	t gr ...	—	4	t	r	+	f	
	6	86	7	t m l m	... l si	—	0	l	r	—	m	
Lot 3	7	50	8	t m l s	t si ...	—	0	t	m	—	f	
	8	56	8	t m l m	t si ...	—	2	t	m	+	f	
	9	51	6	t m l s	t si ...	—	1	t	m	+	f	
Lot 4	10	39	7	t m l s	t si ...	—	0	t	r	—	f	
	11	38	6	t m l m	t si ...	—	0	t	r	—	m	
	12	37	6	t m l m	t si ...	—	0	t	sm	—	t	
Lot 5	13	31	6	t m l m	t si ...	+	0	t	r	+	so	
	14	26	7	t m l m	t si l si	—	2	t	sm	—	m	
	15	25	7	t m l m	t si ...	—	0	t	m	—	f	Tubers Nos. 1 3, 5, and 13 had pieces broken from apex when planted.

d = deep f = firm gr = groups l = lateral m = medium r = rough
s = shallow si = single sm = smooth so = soft t = terminal
+ = injured — = not injured.

Numbers printed in heavy type indicate that the tubers in question produced bad plants.

resembled that of the bad plants grown in the open (see section A). By May 2 only five plants remained with green uninjured foliage—tuber numbers 1, 2, 3, 4, and 6, Table III.—originating from the heaviest sets by weight. In fact, all the tubers, with one exception, above 80 grammes by weight produced good plants, all below 60 grammes by weight bad plants.

D.—*Relation between Soil and Leaf-blotch.*

Experiments were made to ascertain the effect of planting sound tubers in soils from different localities—the "climatic" conditions being constant.

This experiment was commenced early in February in order that it might be possible to exhibit some of the plants raised at the International Horticultural Exhibition held in May 1912. It was, of necessity, on a small scale, owing to the difficulty of obtaining quantities of imported soil.

The soils chosen and actually used were as follows:

1. Sandy soil from the R.H.S. Gardens, Wisley, not previously used for potatos.

2. Reddish loam from the Dunbar potato fields; a small percentage of bad plants was produced, at Dunbar, in this soil, in 1910.

3. A light-coloured clay from the experimental grounds of the S.E. Agricultural College, Wye; bad plants were produced on this soil in 1911.

4. Old garden soil from the Chelsea Physic Garden; bad plants occurred in this soil in 1911.

Eight tubers, chosen from the specially selected ones scheduled in Table I., were potted in each of the four soils used, as follows:

	Table Numbers
Potted in Wisley soil	17 3 2 20 13 22 1 19
,, ,, Dunbar ,, ...	15 24 8 26 14 21 5 16
,, ,, Wye ,, ...	65 57 67 68 53 64 61 56
,, ,, Chelsea ,, ...	12 6 9 10 7 4 18 11

The pots were then kept in the greenhouse attached to the Laboratory.

The plants very soon showed pathological symptoms precisely similar to those so familiar in the field crop. Yellowness was first observed in sprouts in Dunbar soil towards the end of February. These recovered and by the end of March all the plants in Dunbar soil were green, but the leaves on two plants grown in Chelsea soil were yellow and curled. On May 2, plants from tubers 65 and 67, in Wye soil, 20 in Wisley soil, 26 in Dunbar soil, and 11 in Chelsea soil, showed typical bad foliage. Thus bad plants, similar to those occurring outdoors later in the year, were produced in all the soils selected.

E.—*Effect of Planting Tubers produced by Bad Plants.*

The tubers used were obtained from the following sources, and their characters are tabulated in Table IV.

(*a*) Sent by Professor E. S. Salmon from the South-Eastern Agricultural College, Wye, the produce from bad plants marked at Wye by the writer in 1911 (tubers 1–14).

(*b*) Sent by a grower from bad plants growing near Edinburgh (tubers 15–20).

(*c*) Sent by a grower from bad plants at Dunbar in 1911 (tubers (21–26).

The tubers received from Wye had been removed from bad plants by Professor Salmon, and the produce from each bad plant enclosed in a separate parcel. The contents of each parcel were photographed upon arrival at Wisley, so that each group in figure 193—marked Plant 1, Plant 2, and Plant 3 respectively—represents the total produce from a bad plant.

Three lots were selected for the experiment, lot 1 consisted of tubers 1–3, being the produce of a single plant grown at Wye (see fig. 193); lot 2, of tubers 15–17 from near Edinburgh; and lot 3, of tubers 21–26 from Dunbar.

It will be seen both from the table and the photographs that the tubers produced by bad plants are of small size—the largest recorded in the table weighing only 52 grammes. This is the common experience with the 'President.'

TABLE IV., SHOWING THE CHARACTERS OF TUBERS OBTAINED FROM BAD PLANTS.

		Tuber number	Weight in grammes	Number of eyes	Eyes shallow or deep	Grouping of sprouts	Sprouts injured or not	Number of sprouts removed	Situation of sprout left	Skin smooth or rough	Skin injured or not	Texture of the tuber
Wye	Plant 1	**1**	19	6	t s l s	... ...	—	...	...	r	—	m
		2	20	7	t m l m	... ...	—	...	...	r	—	m
		3	11	6	t m l m	... ...	—	...	...	r	—	m
	Plant 2	4	all less than 35 grammes each	6	t m l m	t si ...	+	0	t	sm	+	f
		5		6	t m l m	t si l si	+	3	t	sm	+	f
		6		6	t m l s	t si ...	—	0	t	sm	+	m
		7		6	t m l m	t gr l si	—	2	t	sm	+	so
	Plant 3	8		11	t m l m	t si ...	—	0	t	sm	+	m
		9		9	t m l m	t si ...	—	0	t	r	+	m
		10		8	t m l m	t si ...	—	0	t	sm	—	m
		11		7	t m l m	t si l si	+	0	t	sm	+	so
		12		6	t s l s	... ...	—	—	—	r	+	m
		13		7	t m l m	... ...	—	—	—	r	+	so
		14		8	t m l m	... ...	—	—	—	r	+	so
Edinburgh		**15**	52	8	t s l m	t gr ...	+	2	t	m	+	m
		16	23	9	t m l m	t si ...	+	0	t	sm	+	m
		17	9	7	t m l m	t si ...	—	0	t	sm	—	m
		18	...	5	t m l m	t si ...	+	0	t	m	+	so
		19	...	7	t s l s	t si ...	+	0	t	m	+	so
		20	...	5	t m l m	t si ...	+	0	t	sm	—	so
Dunbar		**21**	36	8	t m l m	t si l si	+	1	t	m	—	m
		22	24	8	t m l m	t si ...	+	0	t	m	+	m
		23	18	6	t s l s	t si ...	+	0	t	m	—	m
		24	20	8	t s l s	t si ...	+	0	t	r	+	m
		25	20	6	t m l m	t si ...	+	0	t	m	+	m
		26	14	7	t m l s	t si ...	+	0	t	m	+	so

d = deep f = firm gr = groups l = lateral m = medium r = rough
s = shallow si = single sm = smooth so = soft t = terminal
+ = injured — = not injured.

Numbers printed in heavy type indicate that the tubers in question produced bad plants.

All these tubers, with a single exception (Table IV. 22), produced bad plants, as at Chelsea in 1911. The exceptional plant had been growing in a different situation, having been placed on the floor of the greenhouse in partial shade under moister conditions.

F.—*Relation between Bad Plants and Tuber Characters.*

Experiments to ascertain whether the occurrence of bad plants is in any way correlated with tuber characters:

(*a*) Planting soft or flabby tubers—sent from Dunbar.

The tubers referred to in section B of this Report and scheduled in Table I. *c* were, with the exception of tuber 76, planted in a row apart from the main plot, in 1912, with the following result:

Tuber 70	Table I.	medium	blotched	foliage.
,, 71	,, ,,	soft	,,	,,
,, 73	,, ,,	medium	,,	,,
,, 74	,, ,,	soft	,,	,,
,, 75	,, ,,	soft	green	,,

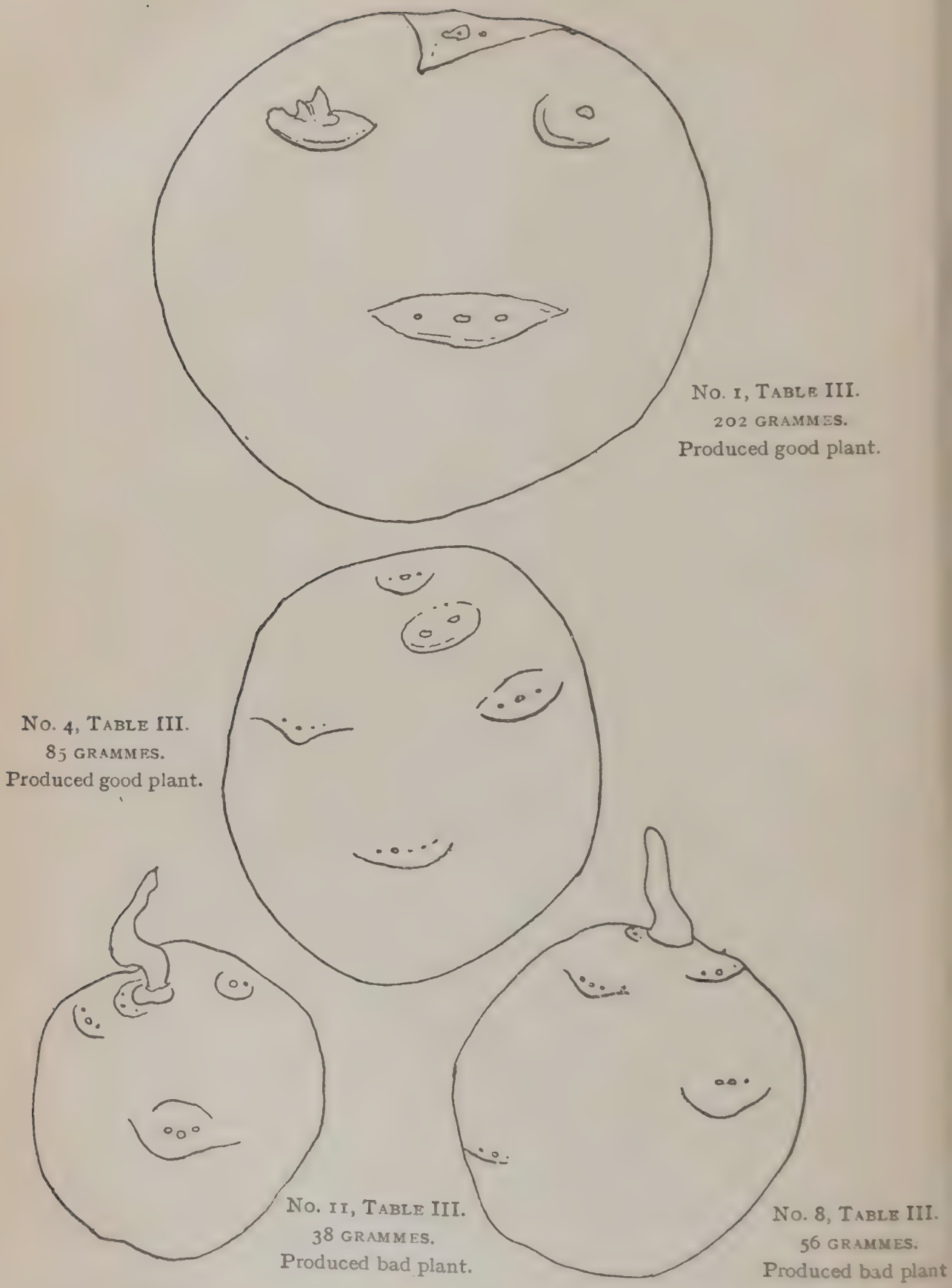


Fig. 194—Tubers showing Actual Shape and Size
(*Cf.* Table III. Nos. 1, 4, 8, 11).

FIG. 195.—A 'BAD' AND A 'GOOD' PLANT OF POTATO 'PRESIDENT.'

[To face p. 1003

FIG. 100.—A 'BIG' PLANT OF 'TRIUMPH' IN EDGAR, [illegible] 1898
TOWN [illegible]

It must be remarked, however, that very few plants in the row other than those arising from soft tubers produced good foliage, so that the single case of a green plant (75) is worthy of note.

Tuber 76, one of the softest, was photographed (fig. 192) and then cut in half along the line $\alpha - \beta$. The halves were potted in Wisley soil and placed in the greenhouse. Both halves produced blotched plants, and the latter were exhibited as typical bad plants at the Royal International Horticultural Exhibition.

It cannot be clearly stated that soft or flabby tubers necessarily produce bad plants.

(*b*) Rough or smooth skin.

It will be seen from the appended table that the occurrence of bad plants bears no relation to the character of the skin of the planted tuber.

Tuber	57	Table I.	skin	rough	bad	plant.
,,	65	,, ,,	,,	smooth	,,	,,
,,	20	,, ,,	,,	smooth	,,	,,
,,	26	,, ,,	,,	moderate	,,	,,
,,	11	,, ,,	,,	moderate	,,	,,

(*c*) Other characters.

A number of scheduled tubers (Table I.) were planted in the open and produced a greater number of bad and poor plants than those grown in the greenhouse (section D *b*). The following descriptions refer to consecutive plants in the row :

39 Table I. good foliage.
38 ,, ,, only a few inches high, blotched foliage.
41 ,, ,, only a few inches high, not blotched foliage.
31 ,, ,, blotched foliage, in flower.
45 ,, ,, blotched foliage, in flower.
48 ,, ,, good foliage.
27 ,, ,, part of the foliage blotched.
28 ,, ,, blotched foliage, in flower.
32 ,, ,, a poor plant.
44 ,, ,, good foliage, in flower.
47 ,, ,, blotched foliage, in flower.

With these examples of bad plants in addition to those mentioned above (E *b*), let us test other characters :

1. Sprouts damaged or not before planting.

Sprouts damaged.				Sprouts not damaged.			
20	Table I.	Bad plant		11	Table I.	Bad plant	
57	,, ,,	,,	,,	26	,, ,,	,,	,,
65	,, ,,	,,	,,	38	,, ,,	,,	,,
21	,, ,,	Good plant		31	,, ,,	,,	,,
				28	,, ,,	,,	,,

Hence bad plants were produced by tubers whether the sprouts were injured or not.

2. Skin injured or not.

Skin injured.				Skin not injured.			
11	Table I.	Bad plant		26	Table I.	Bad plant	
20	,,	,,	,,	57	,,	,,	,,
65	,,	,,	,,	28	,,	,,	,,
47	,,	,,	,,	31	,,	,,	,,
16	,,	,,	Good plant				

Hence bad plants were produced by tubers whether the skin was injured or not.

And similarly in the case of other characters.

Thus it has not been possible to determine any relation between the occurrence of bad plants and certain characteristics of the planted tubers.

Summary.

1. The 'President' produced crops of little value when planted in the open, in light sandy soil at Wisley, in 1912 and 1913.

2. A greater proportion of bad plants occurred at Wisley in both years than at Wye and Chelsea, in 1911.

3. The bad plants were dwarfed, with yellowish, blotched foliage and curled or folded leaves, and resembled those I saw in Scotland in 1910. Some plants failed to grow more than a few inches in height.

4. In Scotland both good and bad plants set seed; both good and bad flowered at Wisley, but did not set seed.

5. The blotched condition of the foliage at Wisley was not due to *Macrosporium Solani*, this fungus being absent.

6. The bad plants produced only two or three small tubers each, as at Wye and Chelsea, in 1911.

7. Tubers from bad plants produced bad plants, as at Chelsea, in 1911. One tuber, which has not been included in the Report, placed in a different environment gave rise to a plant with good foliage.

8. In the greenhouse experiments tubers above the usual size used for planting produced good plants; tubers below the usual size, bad plants; tubers of medium size, both good and bad plants.

9. Both good and bad plants were produced at Wisley from tubers of medium size planted in soils obtained from Dunbar, Wye, and Chelsea.

10. The tubers are highly variable in shape, eye characters, texture, and kind of skin, but the occurrence of bad plants does not appear to be in any way related to these characters or to injuries to the tubers or sprouts.

I desire specially to acknowledge the valuable assistance given me in these investigations by Mr. F. J. Chittenden, the Director of the Laboratory, and I also take this opportunity of thanking Professor E. S. Salmon, F.L.S., for carrying out experiments at Wye in 1911 and for the tubers and soil mentioned in this Report, Mr. J. W. Hope, Dunbar, Mr. T. A. Scarlett, Edinburgh, and the Curator of the Chelsea Physic Garden, Mr. W. Hales, A.L.S., for their trouble and kindness in sending tubers and soil.

XX.—BLOTCH AND STREAK IN POTATOS.

By A. S. Horne, B.Sc., F.G.S., F.L.S.

The forms of disease investigated here are those described and figured for the first time in England, by the writer, in the *Journal of Agricultural Science*.* Both blotch and streak are tuber diseases —the haulm is not affected—prevalent in England, Scotland, and Ireland, and both may be merely phases of one disease, but the matter has not yet been definitely and scientifically proved. In both cases the typical disease cannot be detected with certainty by external inspection: the tuber must first be cut open to show the brown spots, blotches, or streaks that disfigure the flesh and render the affected potatos unfit for human consumption and unsuitable for use as "seed."

It is not my purpose at this juncture to discuss the whole subject, since it is hoped to present to this Journal an exhaustive Report on the probable cause of blotch and streak, the geographical distribution of these forms of disease, and suggestions for dealing with them at a later date. The immediate object is to describe some experiments recently carried out at Wisley, but in order to render the account more intelligible the progress of the investigation since its inception must first be briefly reviewed.

In 1908 I received for investigation from Messrs. Sutton a sack of the potato 'Sutton Flourball' affected with internal disease. This furnished the opportunity of studying the disease in a single known variety. Quantities of tubers of other varieties were soon received from other sources, but here the markings were in the form of streaks (locally called "sprain"). Since diseased samples could frequently be traced to consignments from Scotland, I utilized a grant provided by the Royal Society for the study of the obscure diseases of potato, to visit the potato fields of Scotland and to make arrangements for a series of experiments. With the hearty co-operation of Dr. W. G. Smith and Mr. W. Bruce, B.Sc., of the East of Scotland College of Agriculture, and Professor J. W. H. Trail, F.R.S., of Aberdeen University, several trial plots were planned on land known to produce crops affected with "sprain," and disease-free tubers of 'Duke of York' from Aberdeenshire were chosen for "seed." In the meantime I had secured the co-operation of Mr. W. G. McGowan, who carried out and reported upon a parallel series of experiments in another locality. In each experiment a high percentage of streak occurred in the crop from 'Duke of York.'

* Horne, A. S., in *Jour. Agr. Sci.* iii. (1910) p. 322.

Some of these diseased tubers were exhibited and reported upon before the Scientific Committee of the Royal Horticultural Society in 1912.*

Owing to various circumstances these experiments could not be repeated in the following year.

The results obtained from the experiments in Scotland suggested the possible infection of the crop by an organism or organisms. Now I have already pointed out that blotch and streak are not caused by a fungal organism; if one is present at all, it would probably be of bacterial nature. Should this prove to be the case, we are faced with the possible infection of crops not only through planting diseased tubers but through planting healthy tubers raised on infected land and carrying infected soil.

During the period covered by these investigations the Director had from time to time received specimens of diseased tubers sent from different parts of the country, and several cases were reported to him at the Laboratory in 1911, 1912, and 1913. He accordingly agreed that it was advisable to conduct some experiments at Wisley, and amongst other things suggested trying the effect of planting tubers washed in tap-water to remove adherent soil, and not washed, with the object of testing the point at issue.

Experiments, 1912.

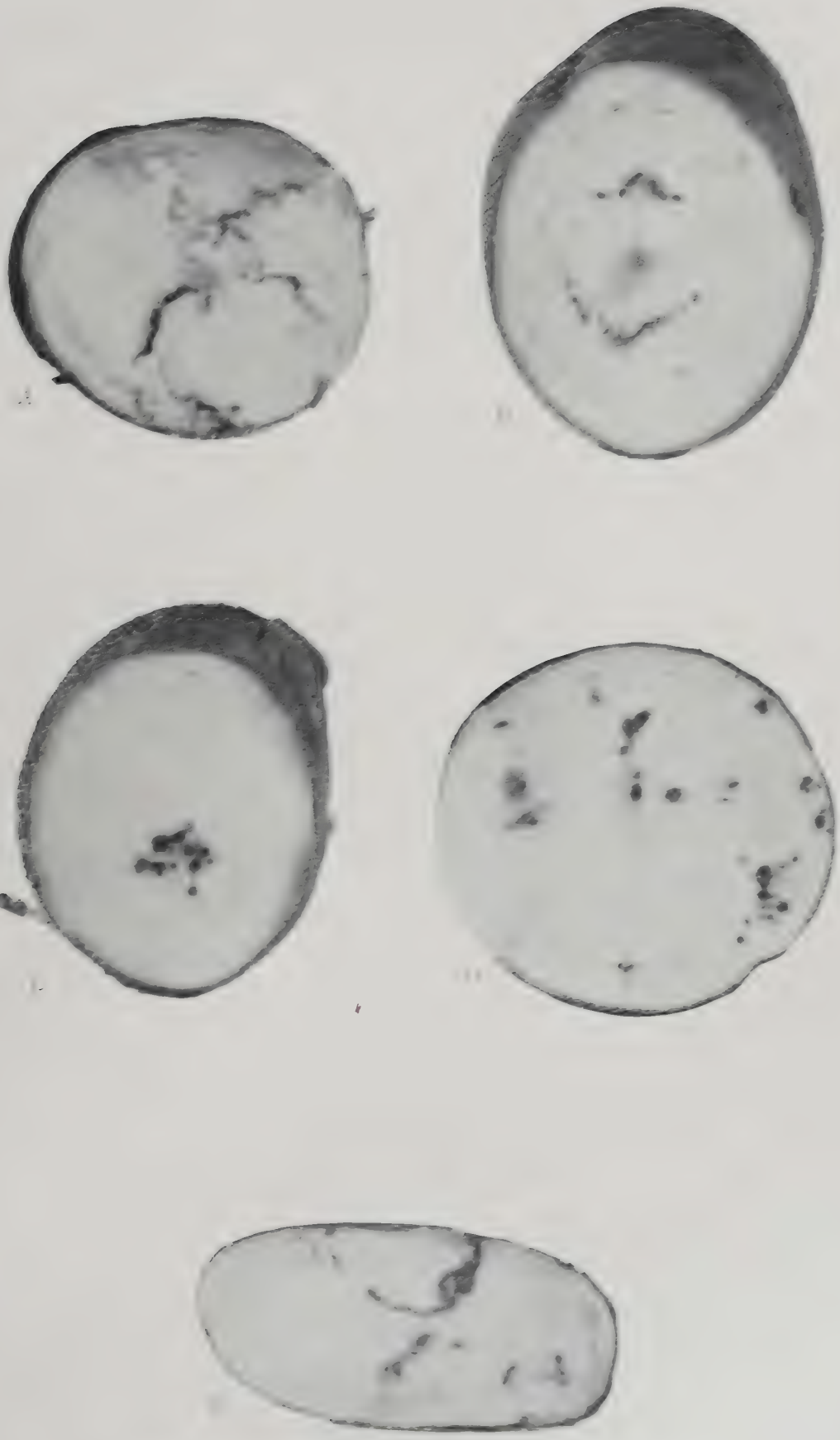
Exp. I. An experiment was designed with the object of attempting to infect disease-free tubers, planted at Wisley in soil not previously used for potatos, with streak.

The potatos used were 'Duke of York,' kindly given by Messrs. Sutton, who made a special effort to supply them from land which had not produced crops affected with blotch or streak. I examined the tubers when they arrived and found them free from disease. An attempt was to be made to infect them by mixing supposedly infected soil with the soil in which they were to be planted. The imported soil was sent from the farm in East Lothian that had produced the diseased 'Duke of York' potatos in the experiments in 1911. Unfortunately the soil was detained in Scotland during the great railway strike, and arrived too late for the purpose of the experiments.

Exp. II. Experiment to determine the effect of washing tubers obtained from a supposedly infected soil.

The experiment was arranged as shown in Table I. The tubers used were all 'Duke of York,' and lots A, B, C, and D were chosen from those raised in the experiment carried out in Scotland in the previous year. All the sets planted in lots A and C were affected with streak, and all the sets in lots B and D were completely free from streak, when planted. The tubers were tested by cutting

* See Journal R.H.S. vol. xxxvii.(1912) p. ccxix.



them through lengthwise, beginning at the stalk or " heel " end. Those with the very least trace of spot, blotch, or streak were rejected in selecting disease-free tubers. Hence only half-tubers were planted. Lots E and F were selected from the disease-free tubers given by Messrs. SUTTON, tested as above, and planted as a control.

Washing was carried out by thoroughly rinsing the half-tubers with tap-water ; the sets were then allowed to dry. The washed lots are those marked C, D, and F in the Table.

TABLE I.—EXPERIMENTS WITH POTATO 'DUKE OF YORK,' 1912.

Whence obtained	Whether diseased or not-diseased half-tubers were planted	Whether sets were washed or not	Numbers of rows	Number of sets planted	Total weight of crop	Reference number
From experimental plots in Scotland	Diseased	Not washed	1, 2, 3	72	63 lb.	A
	Diseased	Washed	4, 5, 6	72	52 ,,	C
	Not diseased	Not washed	7, 8, 9	72	80 ,,	B
	Not diseased	Washed	10, 11, 12	72	88 ,,	D
Messrs. SUTTON, Reading	Not diseased	Not washed	13, 14, 15	72	85 ,,	E
	Not diseased	Washed	16, 17, 18	72	85 ,,	F

The tubers were planted, in April, in light sandy soil previously treated with a little artificial manure, and lifted at the end of August. They were then stored in boxes for the winter. A number of the tubers of each lot were tested from time to time, some immediately after lifting, others at various intervals. The result of the examination of tubers from September 1912 to January 20, 1913, is shown in Table II. Here we see that streak had appeared, but only in lots A, C, and B, and blotch in lot F. *Phytophthora* occurred in all except lot A, but no cases of dry rot are recorded.

Table II. should be compared with Table III., in which the results are recorded from January 20 to April 1913. There is no evidence to show that streak had increased during the winter, whilst the percentage of blotch is apparently less. This percentage, however, is probably less than it should be, since some of the tubers would become infested with *Fusarium*, shrivel up, and be recorded as cases of dry rot. It will be noted that seven per cent. of the tubers are classified under dry rot, as against none at all in Table II.

TABLE II.—EXPERIMENTS WITH POTATO 'DUKE OF YORK.'

Result of examination of tubers from September 1912 to January 20, 1913.

Reference letter	Number of tubers examined	Streak	Phyto-phthora	Blotch	Dry rot	Total	Percentage			
							Streak	Phyto-phthora	Blotch	Total
A	100	6	0	0	0	6	6	0	0	6
C	258	39	9	0	0	48	15	3·5	0	18·5
B	280	11	3	0	0	14	4	1	0	5
D	206	0	0	0	0	0	0	0	0	0
E	140	0	9	0	0	9	0	6·4	0	6·4
F	184	0	13	16	0	29	0	7	9	16

TABLE III.—EXPERIMENTS WITH POTATO 'DUKE OF YORK.'
Result of examination of tubers from January 20, 1913, to April 1913.

Reference etter	Number of tubers examined	Streak	Phyto-phthora	Blotch	Dry rot	Total	Percentage				
							Streak	Phyto-phthora	Blotch	Dry rot	Total
A	—	—	—	—	—	—	—	—	—	—	—
C	—	—	—	—	—	—	—	—	—	—	—
B	100	2	0	0	2	4	2	0	0	2	4
D	432	0	8	0	3	11	0	2	0	1	3
E	264	0	16	4	4	24	0	6	1·5	1·5	9
F	528	0	2	21	38	61	0	0	4	7	11

Let us now survey the total results of the whole experiment displayed in Table IV. We have first of all a small percentage of blotched tubers amongst those grown from the disease-free sets presented by Messrs. SUTTON (lots E and F). The marks consisted chiefly of brown spots, specks, and blotches, and did not take the form of streaks such as appeared in the same variety when grown in Scotland. The tubers in question were mainly confined to the produce from washed sets: there being only four cases among the 404 tubers derived from the unwashed sets.

The yield from the diseased sets was very poor, as shown in Table I., due to the fact that many of the sets produced poor plants or entirely failed. Streak appeared among the tubers originating from these sets as in all my previous experiments conducted elsewhere: but only six out of a hundred tubers produced by unwashed sets were affected, whereas there were 39 cases among 258, or fifteen per cent., in the produce from washed sets.

An exactly opposite result was obtained with lots B and D. The tubers used here as well as those in lots A and B were chosen, it will be remembered, from the potatos raised on land that produced a crop affected with streak in the previous year. The produce from the washed sets yielded not a single case of streak and only eight cases of *Phytophthora* among 638 tubers examined, whilst the produce from the unwashed sets yielded 13 cases of streak and three of *Phytophthora* among 380 tubers.

TABLE IV.—EXPERIMENTS WITH POTATO 'DUKE OF YORK.'
Total result of examination of tubers from September 1912 to April 1913.

Reference letter	Number of tubers examined	Streak	Phytophthora	Blotch	Dry rot	Total	Percentage				
							Streak	Phyto-phthora	Blotch	Dry rot	Total
A	100	6	0	0	0	6	6	0	0	0	6
C	258	39	9	0	0	48	15	3·5	0	0	18·5
B	380	13	3	0	2	18	3·5	1	0	·5	5
D	638	0	8	0	3	11	0	1	0	·5	1·5
E	404	0	25	4	4	33	0	6	1	1	8
F	712	0	15	37	38	90	0	2	5	5·5	13

Exp. III. Rows of each of the following varieties were planted adjoining the plot used for the 'Duke of York':

(*a*) 'Sutton Flourball.'—Disease-free sets were selected from potatos raised at Walton-on-Thames, in soil that had produced crops affected with internal disease, in 1911.

(*b*) 'Langworthy,' 'Up-to-Date,' and 'Northern Star.'—Disease-free sets were selected from tubers raised, in 1911, on land that had produced crops affected with streak.

(*c*) 'Langworthy.'—Disease-free sets were chosen from a sample sent to the Director from Liverpool in 1912.

The tubers were lifted at the end of August. Those examined yielded the result shown in the following Table.

TABLE V.—EXPERIMENT WITH OTHER VARIETIES IN 1912.

	Number of tubers examined	Streak	Blotch	Other marks	Phyto-phthora
'Sutton Flourball' . . .	341	0	9	0	13
'Langworthy'	100	0	2	1	0
'Up-to-Date'	100	0	0	1	8
'Northern Star' . . .	100	0	0	0	0
'Langworthy' (Liverpool) '. .	200	8	6	15	3

The cases among 'Sutton Flourball' were exceedingly slight, the flesh being slightly spotted in each case. There were eight pronounced cases of streak and six definite cases of blotch among the 'Langworthys' from Liverpool; in the fifteen undefined cases the flesh appeared semi-transparent and tinged with brown in places.

EXPERIMENTS IN 1913.

Disease-free tubers from the 1912 crop were selected for planting in 1913 on land adjoining that used in the previous year and not before planted with potatos. About sixty sets (half-tuber) were chosen from the produce yielded in each of the lots A, C, B, D, E, and F in the previous year—all of 'Duke of York.' In addition to these about sixty sets of 'Duke of York,' affected with streak, were selected from the diseased tubers produced in the 1912 crop (lot G). Lastly, three rows of tubers selected from the produce of each of the other varieties used in 1912 were planted (lots H, I, J, K, L).

The sets were planted about the middle of April, and the produce lifted on October 10. The yield was, on the whole, very poor and very uneven, as is usual when an attempt is made to grow potatos from seed raised in the garden. The tubers were examined during October and the results obtained are shown in the following Table.

TABLE VI.—RESULT OF POTATO EXPERIMENTS IN 1913.

Lot	Variety	Number of tubers examined	Streak	Blotch	Phyto-phthora	Remarks
A	'Duke of York,' originally from Scotland	98	0	0	20	1 doubtful mark.
C		71	0	0	3	4 large tubers hollow, 1 doubtful mark.
B		115	0	0	42	1 doubtful mark.
D		89	0	0	4	
E	'Duke of York,' originally from Messrs. SUTTON	66	0	0	1	
F		75	0	0	3	1 doubtful mark.
G	'Duke of York' diseased sets	36	0	0	0	129 tubers were examined, including small ones.
H	'Sutton Flourball'	70	0	0	2	
I	'Langworthy' (Liverpool	68	0	0	0	
J	'Langworthy'	166	0	0	12	
L	'Up-to-Date'	?	0	0	?	
K	'Northern Star'	?	0	0	?	

N.B.—Only the results from potatos of medium size are recorded here. A large number of very small tubers examined were not diseased.

The Table shows that *blotch and streak were entirely absent in* 1913, *even among the produce from sets affected with streak.* The disease in the potatos was this season entirely due to *Phytophthora infestans*, and, curiously enough, practically confined to the produce from lots A and B.

TABLE VII.—TUBERS FROM PLANTS PRODUCED BY DISEASED SETS SCHEDULED WITH REGARD TO SIZE.

Number of plant	Total number of tubers	Large	Medium size	Very small
1	5	0	2	3
2	3	0	0	3
3	11	0	4	7
4	10	0	4	6
5	5	0	3	2
6	2	0	0	2
7	9	0	5	4
8	8	0	3	5
9	3	0	0	3
10	4	0	0	4
11	5	0	2	3
12	4	0	0	4
13	9	0	2	7
14	8	0	2	6
15	9	0	3	6
16	4	0	0	4
17	5	0	0	5
18	3	0	0	3
19	2	0	0	2
20	9	0	3	6
21	11	0	4	7
	129	0	37	92

Apart from the absence of disease, the yield from diseased sets was exceedingly poor. Only one-third of the sets produced tuber-bearing plants. The produce from these is scheduled in Table VII.

Discussion of Results.

1. Planting diseased sets.

In previous experiments carried out in the North of England, the crop resulting from planting diseased tubers proved an almost negligible quantity. The more favourable cultural conditions obtaining at Wisley undoubtedly tended to make the best of the very worst-conditioned tubers. Even then a large proportion of sets failed to grow, but several of them were much diseased, and hence considerably weakened when planted. If only slightly and moderately diseased sets had been used it is probable that a greater percentage of plants would have developed.

In 1912 streak appeared in the produce from diseased sets, as in previous years, and about ten per cent. of the tubers were affected. But in 1913, for the first time in my experience, not a single case of streak occurred.

Messrs. Sutton, in their Report on Potato Experiments for 1906, state with regard to internal disease that the "proportion of diseased tubers in this year's crop does not appear to be in any way influenced by the presence or absence of disease in the tubers planted." * This statement involves the issue that a diseased crop might result notwithstanding planting sound, healthy sets—the happening I experienced, in 1911, in Scotland, with streak, on land that had frequently borne crops affected with streak. Again, Messrs. Sutton have pointed out to me on more than one occasion that a sound crop may be obtained even when diseased tubers have been used for "seed"—this is quite clear to me from the present year's experience. It is certain that the diseased "seed" used in Messrs. Sutton's experiments was of stronger tone than that used here, and, in a favourable season, might yield an excellent result.

2. Planting streak-free sets (half-tuber) obtained from tubers raised in Scotland on land upon which streak appeared in 1911.

Out of 1018 tubers (lots B and D) only 13 were affected with streak, whilst there were 45 cases among 358 tubers yielded by diseased sets. Here the importance of *selecting healthy tubers* is emphasized. In all my previous experiments, selected tubers, *when planted upon land not previously used for potatos*, yielded very few streaked tubers and upon selecting again, in the following year, streak was practically eliminated.

Sets selected from the tubers raised in 1912 produced no cases of streak in 1913, but in this season the produce from diseased sets was also streak-free.

* Sutton, Messrs., *Potato Demonstration* (1906), p. 29.

3. Planting disease-free sets, specially obtained by Messrs. SUTTON, raised on land, in 1911, upon which streak is unknown.

Whilst not a single case of typical streak appeared in the crop raised at Wisley in 1912, a small percentage of tubers with specked, spotted, or blotched flesh occurred, the marks resembling those characteristic of internal disease. Marks of this kind were absent in 1913, when the only disease prevalent was that caused by *Phytophthora*.

4. The effect of washing.

It may first of all be remarked that washing diseased sets would in no case free the tuber from the risk of conveying infection, since the disease is internal. Washing, indeed, might tend to increase the unhealthy condition of these diseased sets, since it was done after they were cut, and render the yield more unsatisfactory. This supposition seems to be supported by the results obtained. On the one hand, the yield from washed diseased sets was only 52 lb., the smallest recorded in the experiment; and on the other hand 39 cases of streak occurred among 258 tubers, originating from washed diseased sets, whilst 6 cases only arose among 100 tubers produced by the unwashed diseased sets.

The result obtained in the case of the tubers selected free from streak (lots B and D) is inconclusive. It is true that not a single case of streak occurred among the produce from the washed tubers (628 examined), but, on the other hand, the produce from those unwashed yielded only 13 cases (380 examined), or about three per cent.

5. No increase nor spread of the disease during the storage period could be detected. This result is probably due to the fact that the tubers were kept dry and properly stored in trays through the winter.

EXPLANATION OF FIGURE 197.

A. Example of typical streak occurring in the sample of tubers received from Liverpool (see Table V.).

B. Peculiar spot markings in a tuber sent to Mr. CHITTENDEN from Liverpool in 1912 (see Table V.). This tuber was potted as in the case of A, and yielded only a few small disease-free tubers.

C. Peculiar spot markings occurring in the pith region, in a tuber from the Liverpool sample (see Table V.). This tuber was potted as in the case of A, and yielded only a few diseased tubers.

D. Blotched tuber occurring among those received from Liverpool (see Table V.).

E. Tuber of the variety 'Duke of York' affected with streak. This tuber originated from a disease-free sample grown in Aberdeenshire in 1910, and planted in a farm in East Lothian in 1911. It was lifted diseased in 1911, potted and placed in the laboratory greenhouse at Wisley, February 10, 1912; the plant produced yielded a few small disease-free tubers.

XXI.—POLLINATION IN ORCHARDS. III.

Self-fruitfulness and Self-sterility in Apples.

By F. J. Chittenden, F.L.S.

In a former paper * we have pointed out that some apples are self-fertile and others self-sterile. The object of the present paper is to give the results of some experiments upon the point carried out at Wisley during the past few years.

Method of Experiment.

Preliminary experiments showed that most varieties of apples pollinated themselves efficiently if left alone †; for although the stigmas are usually ripe before the pollen, the effective periods of the two overlap a considerable time, and the stigmas come into contact with the pollen of the same flower. Hand-pollination thus appeared to b unnecessary (though it is possible that in a few varieties it may be necessary, as it is in gooseberries when protected from insect visits). For the purpose of these experiments, therefore, it was sufficient to protect the flowers from wind-pollination and insect pollination by covering them with insect-proof bags. Manilla paper bags were found the best for the purpose; and, out of many thousands used, very few were found to have torn so as to admit chance insects: the results where such tearing occurred were regarded as unreliable, and were discarded. In one or two cases, chaffinches tore up the bags into shreds, wherewith to fashion their nests, and, in a few, wasps used parts of the bags for a similar purpose. The bags were placed in position so that each enclosed a cluster of flowers a day or two before the oldest in the cluster opened. Where the stigmas were slightly protruded beyond the petals of one flower in the cluster before the bagging was done, that flower was removed. The bags were securely tied at the mouth round the spur, and often also to the branch bearing it, with raffia. They were left on until the petals had fallen (often until long after they had fallen) and the stigmas had withered. About five thousand clusters of flowers were bagged in this way during the three years covered by the experiment as set out here. The number of flowers in a cluster varies; but if it be taken as six, it will be seen that nearly thirty thousand apple flowers were experimented with in the period under review.

When the bags were removed, the number of immature fruits which

* Chittenden, F. J., "Pollination in Orchards. I. Order of Flowering of Apples," *Journal R.H.S.*, xxxvii. p. 350.

† *Cf.* Müller, *Fertilisation of Flowers.*

had set, and which were well developed, was counted. These were marked so that the number that persisted until harvest could be ascertained.

Notes were also taken of the relative floriferousness of the trees and their relative fruitfulness when exposed to pollination by natural means. These records are set out along with the experimental results in Table II.

Conditions of Experiment.

The trees experimented with were all bush apples of fruiting age, mostly on broad-leaved Paradise stocks, growing near the meteorological station on the hill at Wisley. The meteorological records thus show well what the conditions to which the trees were exposed, during the respective flowering periods, were. The reports on meteorological observations at Wisley, already published,* will give particulars, and the following Table summarizes the conditions over the whole flowering period for each of the years considered.

TABLE I.—THE METEOROLOGICAL CONDITIONS AT WISLEY DURING THE FLOWERING PERIODS OF APPLES, 1911–1913.

	April 16–May 26, 1911	April 3–May 16, 1912	April 10–May 25, 1913
†Mean temperature of air at 9 A.M.	54·9°	52·6°	50·3°
Mean maximum temperature of air	61·7°	60·2°	58·5°
Mean minimum temperature of air	44·8°	42·3°	42·1°
Mean minimum temperature on grass	38·6°	32·9°	38·3°
Mean temperature of soil, 1′ down	51°	51·4°	50·6°
2′ ,,	50·3°	50·3°	49·5°
4′ ,,	48·4°	49·4°	48·4°
No. of ground frosts	7	22	9
No. of air frosts	0	2	2
No. of minima below 42°	11	22	20
Prevailing winds.	S. & S.W.W.	Winds very variable	S. & S.W.
Sunshine	257·4	297·6	247·3
Rainfall	1·51	0·61	3·02

Discussion of Results.

We do not propose to discuss the meaning of the results obtained at this juncture, and the negative results especially are to be regarded with great caution. So many factors interfere with fruit production, besides the single one of lack of efficient pollination, that failure

* CURTIS, R. A., "On Meteorological Observations at Wisley," *Journal R.H.S.* vol. xxxviii., xxxix., and xl.

† These particulars of temperatures give but a rough idea of the actual temperatures to which the trees are exposed, although they are derived from records made by instruments in the midst of the plantation. The very fact that the first three are temperatures recorded within a Stevenson screen, while the trees themselves are exposed, is sufficient to show this. Data have been collected from the past four years by means of special instruments to show how the exposure actually affects the matter. We hope to be in a position shortly to give a summary of the records thus obtained and compare them with the screen records.

to fruit may be too easily regarded as due to this cause. That lack of efficient pollination is one prolific cause of unfruitfulness there is not a shadow of doubt; but the weather, both of the year before and of the flowering season, is a potent and very complex factor. The extreme conditions of weather prevailing at the season of flowering are mitigated by the enclosure of the flowers in paper bags; but their effects are not entirely removed, for we have had flowers killed by frost even after such enclosure. Birds, fungi, insects of various kinds, and accidents account for still further failures; and no doubt the condition of the tree—an expression that connotes a large variety of circumstances—is answerable for other failures, and accounts for some of the apparently contradictory results recorded below.

An orchard-house has been erected at Wisley to enable us to carry out further experiments, with the object of eliminating some of these disturbing factors, and we propose to postpone the full discussion of the results till some of these further experiments have been carried out. Certain other aspects of the questions, *e.g.*, the relative efficiency of the pollen of different varieties of apples in promoting fruitfulness in another variety, and the necessary conditions for securing efficient pollination, are also being considered and will be reported on in due course. Pears are also being experimented with.

As full discussion of the results is postponed, we have made no attempt here to correlate our findings with those obtained in America and elsewhere.

It is perhaps well to say again that the negative results obtained, and shown in Table II., although suggestive, must not be taken as conclusive evidence of self-sterility. Further, it is not yet clear that a variety behaves in the same way in this respect over the whole of its area of distribution, nor that all the plants of one variety are precisely similar, with regard to this character, though they probably are, other things being equal.

Definition of Terms.

The point that many apples are able to form fruit without the aid of foreign pollen is clearly brought out in the following table, while most appear to be sterile with their own pollen.

I have previously * drawn attention to the fact that the term self-fertility in apples and pears is loosely applied to two classes of phenomena: in the restricted sense, it implies that viable seed is produced; in the wider sense—the sense that alone concerns the producer of fruit—it means that the fleshy envelope of the fruit is formed while there may or may not be seed enclosed within it. For the latter class, I propose the term self-fruitful instead of self-fertile, restricting the latter term to those cases where seed is produced. No attempt has been made to show which varieties are self-fertile in this sense in the Table. The third term, self-sterile, means that fruit formation is not induced by the action of the pollen of the same variety.

* Chittenden, F. J., *l. c. ante* p. 350.

TABLE II.—RESULTS FROM ENCLOSING CLUSTERS OF APPLE FLOWERS IN BAGS AT WISLEY, 1911–1913.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
Alfriston	1911	Poor	Poor	2	None	None
	1912	Fair	None	9	None	None
	1913	—	—	—	—	—
Allen's Everlasting	1911	Good	Good	3	None	None
	1912	Fair	Poor	7	2 (?)‡	None
	1913	Good	Poor	8	None	None
Allington Pippin	1911	Good	Good	9	None	None
	1912	Good	Good	23	9	3
	1913	Good	Fair	9	1	1
Annie Elizabeth	1911	Good	Fair	9	None	None
	1912	Fair	Poor	32	7	2
	1913	—	—	—	—	—
Astrachan Red	1911	—	—	—	—	—
	1912	Fair	Very poor	7	2	None
	1913	—	—	—	—	—
Ard Cairn Pearmain	1911	—	—	—	—	—
	1912	—	—	—	—	—
	1913	Very poor	Very poor	3	None	None
Barnack Beauty	1911	—	—	—	—	—
	1912	Good	Fair	10	None	None
	1913	—	—	—	—	—
Baumann's Red Winter Reinette	1911	Fair	Fair	5	None	None
	1912	—	—	—	—	—
	1913	—	—	—	—	—
Beauty of Bath	1911	Fair	Poor	5	None	None
	1912	Fair	Very poor	13	1	None
	1913	Poor	Very poor	10	None	None
Beauty of Kent	1911	Good	Good	11	None	None
	1912	—	—	—	—	—
	1913	Good	Good	19	None	None
Beauty of Stoke	1911	Good	Poor	6	3	3
	1912	Good	Fair	18	40	2
	1913	—	—	—	—	—
Bedfordshire Foundling	1911	—	—	—	—	—
	1912	Fair	Poor	20	23	None
	1913	—	—	—	—	—
Belle de Boskoop	1911	—	—	—	—	—
	1912	Poor	Very poor	7	None	None
	1913	—	—	—	—	—
Belle de Pontoise	1911	Good	Fair	6	None	None
	1912	Good	Good	19	3	None
	1913	Fair	Very poor	14	None	None

* In many cases fruits set were removed for examination early, and are not included in the last column.

† In many cases the fruits harvested were small and deformed.

‡ Aphides were found in this bag.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
Belle Dubois	1911	—	—	—	—	—
	1912	Full	Excellent	17	15	5
	1913	—	—	—	—	—
Ben's Red	1911	—	—	—	—	—
	1912	Fair	Fair	2	3	None
	1913	Fair	Fair	9	4	2
Bielo Borodawka	1911	—	—	—	—	—
	1912	Very good	Good	15	8	1
	1913	Good	Very poor	12	1	None
Bismarck	1911	Good	Fair	7	None	None
	1912	Good	Good	13	2	1
	1913	Poor	Very poor	5	None	None
Blenheim Orange Pippin	1911	—	—	—	—	—
	1912	Fair	None	5	None	None
	1913	—	—	—	—	—
Blue Pearmain	1911	Good	Good	8	None	None
	1912	—	—	—	—	—
	1913	Poor	Poor	6	None	None
Bow Hill Pippin	1911	Fair	Fair	8	None	None
	1912	Good	Fair	25	8	5
	1913	—	—	—	—	—
Braddick's Nonpareil	1911	Fair	Poor	10	None	None
	1912	—	—	—	—	—
	1913	Good	Fair	34	None	None
Bramley's Seedling	1911	Good	Good	6	None	None
	1912	Fair	Poor	7	None	None
	1913	—	—	—	—	—
Brownlee's Russet	1911	Fair	None	7	None	None
	1912	Good	Good	8	7	None
	1913	Poor	Very poor	10	1	—
Byford Wonder	1911	Poor	Very poor	5	None	None
	1912	Poor	Poor	10	None	None
	1913	—	—	—	—	—
Calville Blanche	1911	—	—	—	—	—
	1912	Good	Good	10	None	None
	1913	—	—	—	—	—
Calville Bois Bunel	1911	Fair	Fair	6	None	None
	1912	—	—	—	—	—
	1913	Poor	Poor	6	1	1
Calville des Femmes	1911	—	—	—	—	—
	1912	Poor	Very poor	7	4	None
	1913	Fair	Fair	6	1	1
Calville Malingre	1911	Poor	Poor	4	None	None
	1912	Good	Good	10	20	10
	1913	—	—	—	—	—

* In many cases fruits set were removed for examination early, and are not included in the last column.

† In many cases the fruits harvested were small and deformed.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
Calville Rouge Précoce	1911	Good	Poor	1	None	None
	1912	Good	Good	6	None	None
	1913	—	—	—	—	—
Calville Rouge	1911	—	—	—	—	—
	1912	Good	Good	10	7	None
	1913	Fair	Fair	4	None	None
Cardinal	1911	—	—	—	—	—
	1912	Very good	Good	22	1	1
	1913	—	—	—	—	—
Cellini	1911	Good	Fair	6	None	None
	1912	Good	Good	43	22	13
	1913	Fair	Fair	15	1	1
Charles Ross	1911	Good	Good	6	3	None
	1912	Fair	Poor	8	11	6
	1913	Poor	Very poor	9	None	None
Chelmsford Wonder	1911	Good	Fair	5	None	None
	1912	Good	Good	23	10	5
	1913	—	—	—	—	—
Christie Manson	1911	—	—	—	—	—
	1912	Fair	Poor	8	8	None
	1913	—	—	—	—	—
Christmas Pearmain	1911	—	—	—	—	—
	1912	Good	Fair	5	12	None
	1913	—	—	—	—	—
Claygate Pearmain	1911	Good	Fair	12	None	None
	1912	Good	Good	24	6	None
	1913	Good	Very poor	13	None	None
Cockle Pippin	1911	Fair	Poor	5	None	None
	1912	Fair	Poor	5	None	None
	1913	Fair	Very poor	7	None	None
Colonel Vaughan	1911	Good	Good	6	None	None
	1912	Fair	Poor	8	6	3
	1913	Fair	Very poor	7	None	None
Court Pendu Plat	1911	Fair	Fair	7	None	None
	1912	Good	Fair	12	1	None
	1913	—	—	—	—	—
Cox's Orange Pippin	1911	Good	Fair	12	None	None
	1912	Good	Good	36	14	4
	1913	Fair	None	13	None	None
Cox's Pomona	1911	Poor	Poor	5	None	None
	1912	Good	Full	16	1	None
	1913	—	—	—	—	—
D'Arcy Spice	1911	Poor	Very poor	4	None	None
	1912	Poor	Very poor	1	None	None
	1913	Poor	None	13	None	None

* In many cases fruits set were removed for examination early, and are not included in the last column.

† In many cases the fruits harvested were small and deformed.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
Devonshire Quarrenden	1911	Good	Good	2	None	None
	1912	Fair	Poor	3	12	9
	1913	Fair	Very poor	40	2	2
Domino	1911	—	—	—	—	—
	1912	Good	Fair	12	7	1
	1913	Good	Fair	12	2	2
Duchess' Favourite	1911	Good	Poor	4	None	None
	1912	Full	Full	6	None	None
	1913	Good	Fair	20	None	None
Duchess of Oldenburg	1911	Good	Good	9	None	None
	1912	Good	Fair	9	1	1
	1913	Good	Poor	40	None	None
Duke of Devonshire	1911	—	—	—	—	—
	1912	Good	Fair	21	17	2
	1913	—	—	—	—	—
Early Peach	1911	—	—	—	—	—
	1912	—	—	—	—	—
	1913	Poor	None	3	None	None
Early Rivers	1911	—	—	—	—	—
	1912	Good	Fair	10	10	None
	1913	—	—	—	—	—
Early Victoria	1911	Excellent	Full	3	3	3
	1912	Poor	None	14	None	None
	1913	Fair	Very poor	8	1	None
Ecklinville Seedling	1911	Good	Fair	8	None	None
	1912	Good	Good	16	None	None
	1913	Poor	None	3	None	None
Egremont Russet	1911	—	—	—	—	—
	1912	Fair	Poor	11	14	5
	1913	Fair	Very poor	9	3	3
Emperor Alexander	1911	—	—	—	—	—
	1912	Poor	None	2	None	None
	1913	—	—	—	—	—
Endsleigh Beauty	1911	—	—	—	—	—
	1912	Fair	Fair	22	None	None
	1913	Poor	None	6	None	None
Fearn's Pippin	1911	—	—	—	—	—
	1912	—	—	—	—	—
	1913	Fair	Poor	12	None	None
Foster's Seedling	1911	Very good	Good	7	None	None
	1912	—	—	—	—	—
	1913	Good	Good	8	1	None
Fraise d'Hoffinger	1911	—	—	—	—	—
	1912	Poor	Poor	6	None	None
	1913	Poor	None	4	None	None

* In many cases fruits set were removed for examination early, and are not included in the last column.

† In many cases the fruits harvested were small and deformed.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
Frogmore Prolific	1911	Very good	Good	4	None	None
	1912	Very good	Good	29	17	1
	1913	Poor	Poor	5	None	None
Gascoyne's Scarlet	1911	—	—	—	—	—
	1912	Poor	Poor	4	5	None]
	1913	—	—	—	—	—
Gladstone	1911	Fair	Poor	10	1	None
	1912	Fair	Poor	22	None	None
	1913	Poor	Very poor	3	None	None
Gold Medal	1911	Good	Good	9	3	3
	1912	—	—	—	—	—
	1913	Fair	Poor	10	None	None
Golden Noble	1911	—	—	—	—	—
	1912	Fair	Very poor	16	11	3
	1913	Poor	None	2	None	None
Golden Reinette	1911	—	—	—	—	—
	1912	Full	Full	26	10	4
	1913	Good	Very poor	17	None	None
Golden Spire	1911	Fair	Poor	4	None	None
	1912	Full	Good	6	5	2
	1913	Fair	Poor	39	10	8
Grantonian	1911	—	—	—	—	—
	1912	Fair	Poor	21	1	None
	1913	—	—	—	—	—
Grenadier	1911	—	—	—	—	—
	1912	Fair	Poor	4	None	None
	1913	—	—	—	—	—
Hambling's Seedling	1911	Good	Very poor	11	None	None
	1912	Fair	Very poor	17	None	None
	1913	Fair	None	14	None	None
Hanwell Souring	1911	—	—	—	—	—
	1912	Fair	Poor	8	3	None
	1913	—	—	—	—	—
Hawthornden	1911	Good	Good	8	None	None
	1912	Fair	Poor	14	4	None
	1913	Good	Poor	8	None	None
Herefordshire Beaufin	1911	—	—	—	—	—
	1912	Poor	Very poor	7	None	None
	1913	—	—	—	—	—
Hollandbury	1911	—	—	—	—	—
	1912	Poor	Poor	3	None	None
	1913	—	—	—	—	—
Hoary Morning	1911	Good	Poor	5	None	None
	1912	—	—	—	—	—
	1913	Good	None	16	None	None

* In many cases fruits set were removed for examination early, and are not included in the last column.

† In many cases the fruits harvested were small and deformed.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
Horemad Pearmain	1911	Fair	Poor	5	None	None
	1912	Fair	Poor	14	None	None
	1913	—	—	—	—	—
Hubbard's Pearmain	1911	Good	Fair	11	No ne	None
	1912	Good	Fair	8	None	None
	1913	Good	Fair	17	None	None
Irish Peach	1911	—	—	—	—	—
	1912	Poor	None	2	None	None
	1913	—	—	—	—	—
James Grieve	1911	Good	Fair	5	None	None
	1912	Good	Full	28	1 (?)	None
	1913	Poor	Very poor	3	None	None
Jubilee]	1911	—	—	—	—	—
	1912	Good	Fair	27	None	None
	1913	Poor	Poor	4	None	None
Kerry Pippin	1911	Fair	Poor	7	1	None
	1912	Fair	Poor	11	2	None
	1913	Poor	Poor	2	None	None
Keswick Codlin	1911	Good	Fair	8	2	1
	1912	Fair	Poor	16	8	3
	1913	Fair	None	11	None	None
King of the Pippins	1911	—	—	—	—	—
	1912	Good	Fair	17	4	None
	1913	Fair	Poor	8	None	None
King of Tompkins County	1911	Poor	Poor	10	None	None
	1912	—	—	—	—	—
	1913	Fair	Very poor	9	None	None
Lady Derby	1911	—	—	—	—	—
	1912	Fair	Poor	12	1	None
	1913	Poor	None	6	None	None
Lady Henniker	1911	—	—	—	—	—
	1912	Poor	Very poor	12	None	None
	1913	—	—	—	—	—
Lady Sudeley	1911	Fair	None	3	None	None
	1912	Fair	Poor	7	1	None
	1913	Poor	None	3	None	None
Landsberger Reinette	1911	Good	Fair	6	None	None
	1912	—	—	—	—	—
	1913	Poor	Very poor	7	None	None
Lane's Prince Albert	1911	Good	Good	13	None	None
	1912	—	—	—	—	—
	1913	Poor	None	1	None	None
Langley Pippin	1911	—	—	—	—	—
	1912	Good	Good	22	5	None
	1913	—	—	—	—	—

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† In many cases the fruits harvested were small and deformed.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
Leopold de Rothschild	1911	—	—	—	—	—
	1912	Good	Poor	17	10	2
	1913	Good	Very poor	41	3	3
Lewis' Incomparable	1911	—	—	—	—	—
	1912	Fair	Fair	14	1	1
	1913	—	—	—	—	—
Livermere Favourite	1911	Good	Good	6	2	None
	1912	—	—	—	—	—
	1913	Fair	Fair	6	None	None
Lord Burghley	1911	—	—	—	—	—
	1912	Fair	Poor	6	6	6
	1913	—	—	—	—	—
Lord Derby	1911	Good	Fair	5	None	None
	1912	Good	Fair	13	12	6
	1913	Fair	Poor	7	3	3
Lord Grosvenor	1911	Good	Good	10	11	2
	1912	Fair	Poor	4	8	None
	1913	Good	Good	12	11	5
Lord Hindlip	1911	Good	Fair	7	None	None
	1912	Poor	None	2	None	None
	1913	—	—	—	—	—
Lord Suffield	1911	Good	Good	6	None	None
	1912	Good	Good	26	25	None
	1913	Poor	None	4	None	None
Mannington Pearmain	1911	—	—	—	—	—
	1912	—	—	—	—	—
	1913	Poor	Very poor	1	None	None
Manx Codlin	1911	Good	Fair	2	None	None
	1912	Good	Fair	14	None	None
	1913	Fair	None	4	None	None
Margil	1911	Fair	Fair	7	None	None
	1912	Fair	Fair	3	None	None
	1913	—	—	—	—	—
Mère de Ménage	1911	—	—	—	—	—
	1912	Fair	Poor	8	None	None
	1913	—	—	—	—	—
Mrs. Barron	1911	—	—	—	—	—
	1912	Good	Fair	13	None	None
	1913	—	—	—	—	—
Mrs. Phillimore	1911	—	—	—	—	—
	1912	Good	Fair	4	None	None
	1913	—	—	—	—	—
Newton Wonder	1911	Fair	Poor	1	None	None
	1912	Fair	Poor	5	2	None
	1913	—	—	—	—	—

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† In many cases the fruits harvested were small and deformed.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
New Hawthornden	1911	—	—	—	—	—
	1912	Good	Good	2	None	None
	1913	—	—	—	—	—
Nonpareil Old	1911	—	—	—	—	—
	1912	Good	Good	6	4	None
	1913	Poor	None	4	None	None
Norfolk Beaufin	1911	—	—	—	—	—
	1912	Poor	Very poor	9	1	None
	1913	—	—	—	—	—
Norfolk Beauty	1911	Good	Poor	2	None	None
	1912	Poor	Very poor	1	None	None
	1913	—	—	—	—	—
Normandy Pippin	1911	—	—	—	—	—
	1912	Fair	Poor	8	None	None
	1913	—	—	—	—	—
Northern Greening	1911	—	—	—	—	—
	1912	Good	Good	10	None	None
	1913	Good	Very poor	10	None	None
Paroquet	1911	—	—	—	—	—
	1912	Fair	Fair	8	3	2
	1913	Poor	Very poor	10	None	None
Peasgood's Nonsuch	1911	—	—	—	—	—
	1912	Poor	Very poor	5	1	1
	1913	—	—	—	—	—
Pine Golden Pippin	1911	—	—	—	—	—
	1912	Good	Fair	3	None	None
	1913	—	—	—	—	—
Pitmaston Russet Nonpareil	1911	—	—	—	—	—
	1912	—	—	—	—	—
	1913	Poor	Very poor	6	None	None
Pott's Seedling	1911	Good	Fair	10	1	1
	1912	Good	Good	2	None	None
	1913	Fair	None	4	None	None
Prince Edward	1911	Fair	Poor	5	None	None
	1912	Full	Full	25	4	None
	1913	Good	None	24	None	None
Rambour Papelin	1911	Good	Fair	4	None	None
	1912	Poor	Poor	1	1	None
	1913	—	—	—	—	—
Red Juneating	1911	Fair	Poor	2	None	None
	1912	—	—	—	—	—
	1913	—	—	—	—	—
Reinette du Canada	1911	—	—	—	—	—
	1912	Good	Fair	7	None	None
	1913	Fair	None	19	None	None

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† In many cases the fruits harvested were small and deformed.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
Ribston Pippin .	1911	—	—	—	—	—
	1912	Good	Fair	20	6	5
	1913	Poor	Very poor	7	None	None
Rival . . .	1911	—	—	—	—	—
	1912	Good	Good	23	8	3
	1913	—	—	—	—	—
Ross Nonpareil .	1911	Fair	Poor	3	None	None
	1912	Fair	Poor	12	None	None
	1913	—	—	—	—	—
Roundway Magnum Bonum . .	1911	Fair	Poor	4	None	None
	1912	Good	Fair	15	None	None
	1913	—	—	—	—	—
Royal Late Cooking	1911	—	—	—	—	—
	1912	Fair	Poor	8	None	None
	1913	Fair	Poor	3	None	None
St. Edmund's Pippin . .	1911	Good	Poor	1	None	None
	1912	—	—	—	—	—
	1913	Poor	Very poor	8	None	None
Sandringham .	1911	—	—	—	—	—
	1912	Good	Fair	27	3	2
	1913	Fair	None	9	None	None
Scarlet Nonpareil .	1911	—	—	—	—	—
	1912	—	—	—	—	—
	1913	Fair	Poor	5	None	None
Scarlet Pearmain .	1911	Good	Fair	7	None	None
	1912	Good	Fair	4	None	None
	1913	Good	None	16	None	None
Seaton House .	1911	Good	Good	6	None	None
	1912	Good	Good	19	None	None
	1913	Good	Good	9	None	None
September Beauty	1911	—	—	—	—	—
	1912	Poor	None	4	None	None
	1913	—	—	—	—	—
Stirling Castle .	1911	—	—	—	—	—
	1912	Poor	Very poor	12	None	None
	1913	Good	Fair	15	3	3
Stone's Apple .	1911	Fair	Poor	2	None	None
	1912	Full	Very good	8	5	2
	1913	Poor	Poor	10	None	None
Sturmer Pippin .	1911	—	—	—	—	—
	1912	Fair	Poor	4	None	None
	1913	Fair	Poor	5	None	None
Sure Crop . .	1911	Fair	Poor	2	None	None
	1912	Fair	Poor	4	2	1
	1913	Fair	Poor	12	4	4

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† In many cases the fruits harvested were small and deformed.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged	No. of fruits set in bags.*	No of fruits harvested.†
Surprise	1911	—	—	—	—	—
	1912	Fair	Poor	23	9	9
	1913	—	—	—	—	—
Tamplin	1911	—	—	—	—	—
	1912	Poor	Poor	6	1	None
	1913	—	—	—	—	—
Thomas Rivers	1911	Good	Good	12	None	None
	1912	Full	Full	21	3	2
	1913	—	—	—	—	—
Tower of Glamis	1911	Good	Good	6	None	None
	1912	—	—	—	—	—
	1913	Good	Fair	38	5	3
Wagener	1911	Good	Poor	10	None	None
	1912	Fair	Poor	8	None	None
	1913	Good	Poor	17	None	None
Waltham Abbey	1911	—	—	—	—	—
	1912	Fair	Very poor	3	None	None
	1913	—	—	—	—	—
Warner's King	1911	Fair	Poor	2	None	None
	1912	Good	Good	20	5	2
	1913	—	—	—	—	—
Watcombe Hero	1911	Fair	Poor	2	None	None
	1912	Good	Good	22	11	5
	1913	—	—	—	—	—
Wealthy	1911	—	—	—	—	—
	1912	Very good	Good	1	None	None
	1913	Fair	None	4	None	None
Wellington	1911	—	—	—	—	—
	1912	Fair	Poor	9	1	None
	1913	—	—	—	—	—
White Juneating	1911	—	—	—	—	—
	1912	—	—	—	—	—
	1913	Poor	Poor	5	1	None
White Transparent	1911	—	—	—	—	—
	1912	—	—	—	—	—
	1913	Good	Fair	8	6	4
William's Favourite	1911	—	—	—	—	—
	1912	Good	Fair	17	None	None
	1913	Fair	Very poor	21	None	None
Winter Greening	1911	Good	Poor	13	None	None
	1912	Fair	Poor	19	1	None
	1913	Good	Poor	19	None	1
Winter Hawthornden	1911	—	—	—	—	—
	1912	Good	Fair	12	None	None
	1913	—	—	—	—	—

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† In many cases the fruits harvested were small and deformed.

Variety.	Season.	Floriferousness of tree.	Fruitfulness of tree.	No. of clusters bagged.	No. of fruits set in bags.*	No. of fruits harvested.†
Winter Majetin .	1911	—	—	—	—	—
	1912	Full	Full	28	22	10
	1913	—	—	—	—	—
Winter Quarrenden .	1911	Fair	Poor	1	None	None
	1912	—	—	—	—	—
	1913	Good	None	14	None	None
Wolf River .	1911	—	—	—	—	—
	1912	Fair	Fair	14	10	None
	1913	—	—	—	—	—
Worcester Pearmain	1911	—	—	—	—	—
	1912	Good	Fair	28	1	None
	1913	Fair	None	11	None	None
Wyken Pippin .	1911	—	—	—	—	—
	1912	Fair	Poor	11	None	None
	1913	Fair	None	12	None	None
Yellow Ingestre .	1911	Fair	Poor	4	None	None
	1912	Good	Good	21	2	None
	1913	—	—	—	—	—
Yorkshire Greening	1911	Good	Good	6	None	None
	1912	Fair	Poor	8	None	None
	1913	—	—	—	—	—
No. 25 . .	1911	Good	Good	3	1	1
	1912	Poor	None	1	None	None
	1913	—	—	—	—	—

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† In many cases the fruits harvested were small and deformed.

REPORT OF THE SOCIETY'S CONSULTING CHEMIST.

By Dr. J. A. Voelcker, M.A., F.I.C., F.L.S.

The number of samples submitted to me by members during the year 1913 was 19, as against 22 in 1912. These comprised the following :—

Basic slag	1
Peruvian guano	1
Meat meal	1
Lime	1
Bastol cake	1
Waters	3
Soils	10
Miscellaneous	1
	19

1. *Basic Slag.*—This gave the following analysis :—

Phosphoric acid	7·55 per cent.
Equal to tribasic phosphate of lime	16·49 ,,
Silica	14·49 ,,
Fineness	83·4 ,,

This cost 32*s.* 6*d.* a ton. It was of low quality and excessively dear in price.

2. *Peruvian Guano.*—Analysis :—

Moisture	15·37 per cent.
Organic matter	22·84 ,,
Phosphate of lime	30·96 ,,
Insoluble siliceous matter	21·92 ,,
Nitrogen	4·78 ,,
Equal to ammonia	5·80 ,,

This cost £9 8*s.* 9*d.* per ton delivered, and was somewhat over-priced.

3. *Meat Meal.*—Analysis :—

Moisture	13·05 per cent.
Phosphoric acid	6·70 ,,
Equal to phosphate of lime	14·64 ,,
Sand	6·67 ,,
Nitrogen	5·54 ,,
Equal to ammonia	6·72 ,,

This manure was in bad condition, containing large pieces of unbroken bone. It cost £6 16*s.* per ton delivered, and at current rates, must be considered too dear.

4. *Lime* (ground).—Analysis :—

Oxide of iron and alumina	1·48	per cent.
Lime	85·79	,,
Magnesia, carbonic acid, &c.	9·28	,,
Silica	3·45	,,
	100·00	,,

This was of fair quality, but was not sufficiently finely ground.

5. *Bastol Cake.*—This gave results as follows :—

Oil	9·25	per cent.
Albuminoids	17·81	,,
Ash	5·10	,,
Sand	1·68	,,

This cake, as is now pretty well known, consists, to a large extent, of prepared wood with molasses and other materials. It has a decidedly insipid taste, and, in my opinion, such a material as prepared wood or sawdust is not a suitable one for giving to stock.

6. The one miscellaneous inquiry referred to the failure of plants, principally bedding Geraniums, to grow properly in a certain soil. Several plants were sent to me, together with the soil in which they were grown. The roots appeared to have become stunted, and then to have made a fresh start. The appearances were such as are not unfrequently associated with the presence of an acid soil. This, however, was not the case here, but, on examination of the soil, I found it to contain a considerable amount of soluble salts, these consisting largely of sulphates of the alkalies. When this is the case conditions unfavourable to the growth of plants are set up. I was unable, however, to obtain information as to the cause of the trouble.

7. *Waters.*—Two of these were for drinking purposes, and one for horticultural use. In the former class, the first sample contained 38·64 grains of total solid constituents, and, though hard, was an organically pure water.

The second sample sent was turbid in appearance and required filtering. It was free from organic impurity, but contained a little zinc in solution.

The water sent for horticultural purposes contained 22·96 grains per gallon of total solids, of which 6·16 grains were lime and 1·31 grains per gallon magnesia. It gave a hardness of 15·3 degrees.

This water, while it might be unsuitable for Ericas, Rhododendrons, &c., was not sufficiently hard to be objectionable for general horticultural purposes.

8. *Soils.* (*a*) *Soil for Vinery Border.*—The complaint was made that the vines flagged, and it was suspected that some harmful chemical had been put on the soil. Examination of this latter, however, showed no sign of the presence of anything injurious.

(*b*) *Soil for Apples.*—The following is the analysis of a sample of

soil from land in the neighbourhood of Canterbury, on which it was wished to grow apples :—

(Soil dried at 212° F.)	Per cent.
Organic matter and loss on heating	3·02
Oxide of iron	3·01
Alumina	2·96
Lime	·80
Magnesia	·60
Potash	·39
Soda	·31
Phosphoric acid	·10
Sulphuric acid	·07
Insoluble siliceous matter	88·74
	100·00
Nitrogen	·125

The soil was by no means a rich one. It was poor in vegetable matter and in nitrogen, and the analysis showed a clear deficiency of phosphoric acid. Nor were the amounts of lime or of potash at all large. Further, the soil was hardly heavy enough in character, nor deep enough, to make a good soil for apple-growing.

(*c*) *Soil for Hydrangeas.*—A sample of soil was sent to me for which it was claimed that Hydrangeas grown in it would be produced of a particularly fine colour. The soil was taken from around the roots of imported Hydrangea plants. The analysis of the soil was as follows :—

(Soil dried at 212° F.)	Per cent.
Organic matter and loss on heating	7·71
Oxide of iron	1·24
Alumina	1·28
Lime	·56
Sulphuric acid	·06
Magnesia, alkalies, &c.	1·46
Insoluble siliceous matter	87·69
	100·00

The soil was practically made up of sand and clay with a large amount of vegetable matter and a little lime.

I should not have been surprised had I found iron present in some quantity in the ferrous state. This, however, was not the case, and there was nothing that I obtained in the analysis which would account for the particular properties attributed to the soil.

(*d*) (1) *Soil from Rose Border*; (2) *Soil from Herbaceous Border.*—These two soils were sent to me because of roses, phloxes, pæonies, &c. not doing well. The analyses were as follows :—

(Soils dried at 212° F.)	Rose garden. Per cent.	Herbaceous border. Per cent.
Organic matter and loss on heating	7·94	8·11
Oxide of iron and alumina	9·82	9·71
Lime	·38	·43
Magnesia	·78	·83
Alkalies	·79	·45
Insoluble siliceous matter	80·29	80·47
	100·00	100·00

The soils were rather light in character and certainly not very suitable for roses. They contained plentiful supplies of vegetable matter, but the contents of lime were small, and it will be observed that in each case there was quite twice as much magnesia as there was lime. I have previously referred to the significance of this fact, and have little doubt that it had to do here with the failure. In such cases I consider that the liberal application of lime is a necessity.

WISLEY SCHOOL OF HORTICULTURE.

FORTY-SEVEN students attended the R.H.S. School of Horticulture at Wisley during 1913. Eighteen completed their two years' course during the year and sat for the School Diploma. The requirements for this include the working of satisfactory "papers" in all four parts of the examination (two written and two practical), and dealing with both principles and operations of horticulture; the presentation of an essay on an approved subject; and of collections of dried plants and of useful and injurious insects. In addition, credit is given for the use of the powers of observation during the two years of the course. Fifteen candidates satisfied the examiners and have been awarded the Diploma. Mr. J. Fraser, F.L.S., acted as external co-examiner with the Director and the Superintendent. The essays were kindly examined and assessed by Mr. J. Hudson, V.M.H.

The winners of the Diploma in order of merit are:—

1. Mr. J. K. Ramsbottom (First prize, value 30*s.*).
2. Mr. H. G. Forsyth (Second prize, value 22*s.* 6*d.*).
3. Mr. G. B. Bassett (Third prize, value 17*s.* 6*d.*).
4. Mr. E. L. P. Thomas (Fourth prize, value 15*s.*).
5. Mr. G. F. Wilson (Fifth prize, value 12*s.* 6*d.*).
6. Mr. D. E. Nicholson.
7. Mr. E. C. Cheshire.
8. Mr. H. Caney.
9. Mr. J. O. Pritchard.
10. Mr. C. W. Daniels.
11. Mr. K. Preston.
12. Mr. R. W. Bassett.
13. Mr. P. N. Ashby.
14. Mr. C. Taylor.
15. Mr. H. J. Taylor.

The first three prizes were provided out of the "Sutton Prize Fund," the others are special prizes.

The "Nicholson" Prize for observation, founded in memory of the late Mr. George Nicholson, author of the "Dictionary of Gardening," was won by Mr. H. G. Forsyth (value two guineas).

Mr. C. Herman Senn, Secretary of the Universal Cookery and Food Association, offered a prize of one guinea for the best essay on the

Maintenance of a Supply of Vegetables the Year Round for a Private Family. This was won by Mr. J. K. Ramsbottom.

Twenty-one students entered for the Society's General Examination in April 1913, and all passed, Mr. J. K. Ramsbottom being placed first in the First Class and winning the Society's Gold Medal and a Scholarship of the value of £25 for two years.

Mr. J. Lee entered for and passed in the first class the Parks Employees' examination, January 1913.

ANTIRRHINUMS AT WISLEY, 1913.

TWO HUNDRED AND SEVEN stocks of Antirrhinums were sent to Wisley, all of which—except a few cuttings sent—were sown on March 13, and when large enough to handle were pricked out into boxes, and later on planted out in an open sunny situation on soil moderately manured, and planted in rows 18 inches apart each way. All made excellent growth, flowered profusely through the summer and autumn, and gave a glorious mass of colour, was much admired by visitors. The Committee recommended that the Antirrhinum should be classed as Tall, Medium, and Dwarf or Tom Thumb. It was considered that the term Nanum often used for the Medium section was misleading. The height of the different sections varies a little on different soils. At Wisley the Tall ones are from 30 to 36 inches; the Medium ones, 18 to 22 inches; the Dwarf or Tom Thumb about 12 inches high.

The Committee examined the collection on two occasions, and considered those bracketed here to be too much alike to warrant different names:—[12, 68, 80, 9, 10, 77, 197]; [198, 195, 40, 157, 173, 155, 41, 26, 69]; [29, 106, 87, 30, 28, 59, 60, 104]; [206, 121, 6, 138, 140, 147]; [33, 146, 24, 148]; [133, 110, 168, 132, 184, 178, 177]; [11, 180, 160]; [66, 120, 47, 50].

A.M.=Award of Merit.
XXX=Highly Commended.

LIST OF THE BEST VARIETIES.

Tall Section.

No.	Name.	Colour.
13.	Beauty	Crimson.
111.	Moonlight	Reddish apricot.
135.	Queen Victoria	White.
151.	Salmon Pink	Purple rose.
186.	Yellow King	Yellow.

Medium Section.

3 & 4.	Amber Queen	Yellow and rose.
12.	Beacon	Vermilion red.
17 & 18.	Bonfire	Coral red and rose.
37.	Carmine Queen	Carmine purple.
41.	Coccineum	Fiery red.
56.	Crimson King	Crimson.
67.	Daphne	Rosy carmine.
69.	Defiance	Fire red.
80.	Fire King	Cherry red and orange.

89.	Golden Morn	Yellow and rose.
90.	Golden Queen	Yellow.
104.	Maize Queen	Yellow and rose.
122.	Pink	Rosy carmine.
149.	Rosy Morn	Rose pink.
164.	Sunset	Dull garnet and yellow
178.	White Beauty	White.
182.	White Queen	White.
185.	Yellow	Yellow.
193.	Yellow Queen	Yellow.

VARIETIES.

*1. Albino.
2. Album fl. pl.
3. 4. Amber Queen.
5. Apple Blossom.
6. Art Shades.
7. 8. Aurantiacum.
9. 10. Aurora.
11. Avalanche.
12. Beacon.
13. Beauty.
14. 15. 16. Black Prince.
17. 18. 19. Bonfire.
20. Brilliancy.
21. 22. 23. Brilliant.
24. 25. Brilliant Rose.
26. Brilliant Vermilion Scarlet.
27. Bronze King.
28. 29. 30. Buff Queen.
31. Butterfly.
32 Canary Bird.
33. Carmine.
34. Crimson King.
35. Carmine King.
36. 37. Carmine Queen.
38. Cerise Queen.
39. Chamois.
40. 41. Coccineum.
42. 43. 44. 45. Coral Red.
46. Coral Rose.
47. 48. 49 50 Cottage Maid.
51. Crescia.
52. Crimson.
53. Crimson and White
54. Crimson King, dwarf.
55. 56. Crimson King.
57. Crimson King, dwarf.
58. Dainty.
59. 60. 61. 62. 63. Dainty Queen.
64. 65. 66. 67. Daphne.

* The number preceding the name is that by which the variety was alone known at Wisley until judging had been completed.

68. Daybreak
69. 70. 71. Defiance.
72. Delicata.
73. Delila.
74. Emperor William.
75. Fairy Queen.
76. 77. 78. 79. Firefly.
80. 81. Fire King.
82. Firelight.
83. Galatea.
84. Gipsy Queen.
85. Gloriosa.
86. Gold Crest.
87. Golden Fairy.
88. 89. Golden Morn.
90. 91. 92. Golden Queen.
93. 94. Hephæstos.
95. Ignesius.
96. Inimitable.
97. Inspiration.
98. Iris.
99. King Alfred.
100. King of Tyre.
101. Le Rêve.
102. Little White Gem.
103. Marjorie.
104. 105. 106. Maize Queen.
107. Mirabundum.
108. 109. Mixed.
110. Mont Blanc.
111. Moonlight.
112. Nobile.
113. Non plus ultra.
114. Orange King
115. 116. 117. Orange Prince.
118. Orange Queen.
119. Orchideæflorum.
120. Perle d'Amour.
121. Phyllis.
122. Pink.
123. 124. Pink & Terra-cotta Shades.
125. 126. Pink Beauty.
127. Pink Pearl.
128. Pink Queen.
129. Pink Rose.
130. 131. Purple King.
132. 133. Queen of the North.
134. 135. 136. Queen Victoria.
137. Red Riding Hood.
138. 139. 140. Rose Dorée.
141. 142. 143. Rose Queen.
144. Rose Superbe.
145. Roseum.
146. 147. Roseum superbum.
148. 149. Rosy Morn.
150. Ruby.
151. Salmon Pink.
152. 153. Salmon Queen.
154. Salmon Rose.
155. Scarlet Beauty.
156. Scarlet Carmine.
157. Scarlet Flame.
158. 159. Scarlet King.
160. Snowflake.
161. Sulphur Fairy.

162.
163. Sunset.
164.
165.
166.
167. Tall Striped.
168. The Bride.
169.
170. Venus.
171.
172.
173. Vesuvius
174.
175. Victoria.
176. Vulcan.
177. White.
178. White Beauty.
179. White Prince.
180.
181.
182. White Queen.
183.
184.
185. Yellow.
186. Yellow King.
187.
188. Yellow Prince.
189.
190.
191.
192. Yellow Queen.
193.
194.
195. Flame.
196. Amber Queen.
197. Aurora.
198. Defiance.
199. Fairy Queen.
200. Dreadnought.
201. Golden Queen.
202. Golden Morn.
203. Pink Beauty.
204. Purity.
205. Queen Mary.
206. Rosy Morn.
207. Salmon Queen.

Tall Section.

7. Aurantiacum (Heinemann).—Flowers large, 33 per cent. white and the remainder rosy magenta in pale and dark shades, mostly having the outside of the tube white. Foliage large and broad. Plants freely branched from the base. Flowering began about August 4. Height 3½ feet; length of spike 18 inches.

11. Avalanche (Barr).—Foliage medium, green; flowers exceptionally fine, sulphury white with deeper lower lip; commenced to flower about July 28. The plant branches freely from the base and carries tall, bold spikes. Two plants in this stock gave rose-coloured flowers and one primrose yellow. Height 3 feet; length of spike 14 inches.

13. Beauty (Barr), **A.M.** September 9, 1913.—Flowers medium, rather narrow, rich crimson. Stems, foliage, and calyces chocolate. Plants freely branched from the base and very free-flowering, commencing about August 13. Stock true. Height 3 feet; length of spike 15 inches.

21. Brilliant (Barr), **XXX** September 9, 1913.—Flowers large, purple garnet; lower lip deep yellow, except at the sides, where the prevailing purple garnet appears; outside of tube sulphury white; in flower at end of August. Height 2½ feet; length of spike 16 inches.

22. Brilliant (Dobbie).—Quite distinct from No. 21. Flowers large, pale French purple, lower lip tipped with orange. Stems brown,

leaves tinted with the same. Plants well branched, free-flowering, beginning about August 4. A pure stock. Height 2½ feet; length of spike 14 inches.

23. Brilliant (R. Veitch).—Similar to No. 21 in colour and habit, but commencing to flower earlier, viz. about August 2. Stock not quite true. Height 2½ feet; length of spike 14 inches.

27. Bronze King (Dickson & Robinson).—Flowers medium, saturnine red, lower lip tipped with yellow, upper lip suffused with salmon pink. Outside of tube mauve rose. The plants branched freely from the base, and commenced to flower at the end of August. Height 3 feet; length of spike 15 inches.

31. Butterfly (Barr).—Flowers large, dark rich crimson, having the lower lip tipped with crimson; the outside of the tube is sulphury white. Foliage, stems, and calyces heavily tinted with chocolate. Plants freely branched from the base. Flowering began about August 13. A pure stock. Height 3 feet; length of spike 1 foot. This stock gave one plant with double flowers.

43. Coral Red (Dickson & Robinson).—Flowers medium, deep rose Neyron red, having the lower lip tipped with deep yellow. The tube is sulphury white on the outside. The plants are well branched from the base, and flower profusely from the middle of August. The stems and margins of the leaves are tinted brown. Two rogues appeared in this stock. Height 3 feet; length of spike 1 foot.

45. Coral Red (J. Veitch), **XXX** September 9, 1913.—Similar to No. 43. Stock pure.

46. Coral Rose (Barr).—A lovely variety having large flowers of a deep rosy carmine shade. The outside of the tube is sulphury white, and the lower lip is tipped with deep yellow. Foliage, stems, and calyces tinted with light brown. Plants very free in flowering, beginning about August 13. A good, true stock. Height 3 feet; length of spike 14 inches.

48. Cottage Maid (Dickson & Robinson), **A.M.** June 26, 1906.—A charming bright madder-carmine variety, having the lower lip tipped with yellow and the outside of the tube sulphury white. Plants branch freely from the base and flower very freely, beginning about August 4. Height 3 feet; spike 18 inches.

49. Cottage Maid (Dobbie), **A.M.** June 26, 1906.—Similar to No. 48, but later in flowering.

51. Crescia (R. Veitch).—Flowers medium, very dark crimson; outside of tube deep carmine violet; in flower August 29. Height 3 feet; length of spike 15 inches.

52. Crimson (J. Veitch).—Flowers medium, very dark crimson, outside of tube light carmine violet; in flower August 27. Height 3 feet; length of spike 15 inches.

53. Crimson and White (J. Veitch).—Flowers large, velvety crimson, having the lobes of the lower lip and the outside of the tube sulphury white. The lower lip is tipped with golden yellow. Plants branch freely from the base, and commenced to flower

freely about August 13. Several plants bearing rosy magenta or pink flowers appeared in this stock. Height 3 feet; length of spike 18 inches.

74. Emperor William (R. Veitch).—A very tall stock, bearing large flowers of various colours, including yellow, crimson, and dull purple lake. The foliage is narrow, dark, and tinted with chocolate brown, which is also the colour of the flower stems. The plants branch very freely from the base, and began to flower with great freedom about July 28. Height 2½ feet; length of spike 16 inches.

75. Fairy Queen (Dickson & Robinson).—A charming variety. Flowers large, orange suffused with rose, the former predominating in the upper part of the lower lip; outside of the tube sulphury white. Foliage, stems, and calyces tinted with light brown. Stock very true. Flowering commenced about August 13. Height 2½ feet; length of spike 1 foot.

79. Firefly (R. Veitch).—Flowers large, dark rosy crimson. Stems and calyces chocolate; foliage broad and tinted with the same. Plants branch freely from the base, and commenced to flower freely about August 13. A very pure stock. Height 3½ feet; length of spike 18 inches.

83. Galatea (Barr), **XXX** September 9, 1913.—Flowers medium, rosy crimson; lower lip primrose yellow, mostly with crimson at the sides; outside of tube sulphury white; in flower August 29. Height 3 feet; length of spike 14 inches.

93. Hephæstos (Barr).—Flowers large, deep orange suffused with rose, and having the lower lip tipped with yellow. Outside of tube dull purple lake. Stems, calyces, and young foliage tinted with light brown. Plants began to flower about August 13. 33 per cent. of the plants in this stock bore crimson flowers. Height 3 feet; spike 18 inches.

94. Hephæstos (R. Veitch).—Similar to No. 93, but more free-flowering and better branched. This stock gave 20 per cent. of plants bearing crimson flowers.

95. Ignesius (R. Veitch).—A very mixed strain, comprising various shades of crimson, deep yellow blotched with chestnut red, primrose yellow, purple garnet with lemon-yellow lower lip. Many plants had chocolate stems and foliage tinted with the same, while the others were plain green. Flowering commenced about August 4. Height 3 feet; length of spike 18 inches.

96. Inimitable (R. Veitch).—A tall striped variety, having large crimson flowers blotched with a deep shade on the lower lip, which is tipped with bronze. The stems are chocolate, which colour also appears in the margins of the leaves. Plants freely branched, flowering with wonderful freedom, beginning about August 4. Stock not quite true. Height 3 feet; length of spike 15 inches.

100. King of Tyre (R. Veitch).—This stock gave a great diversity of colour and habit, including deep rosy carmine, rose, deep crimson

and yellow. The flowers were mostly very large and borne on well-branched plants, which commenced to bloom about August 13. Height 3 feet; length of spike 1 foot.

101. Le Rêve (Barr).—Flowers medium, bright carmine purple, lower lip tipped with golden yellow. Flower stems light brown, which colour also appears at the margins of the leaves. Plants well branched, commencing to flower about August 4. Stock pure. Height 3 feet; length of spike 14 inches.

107. Mirabundum (R. Veitch).—A tall striped variety, having large white flowers with a large blotch of dull crimson on the lower lip and a suffusion of violet rose on the upper one. The former is tipped with yellow, and the middle lobe of the lower lip is suffused with the same colour as the upper one. Plants freely branched at the base, free-flowering, beginning about August 4. Stock true. Height 3 feet; length of spike 16 inches.

111. Moonlight (Dobbie), **A.M.** September 9, 1913.—A very distinct variety. Flowers medium, reddish apricot suffused with rose, and having the upper part of the lower lip chrome yellow. The rose suffusion is especially noticeable at the margins. The outside of the tube is old rose. The flower stems, young leaves, and calyces are tinted with brown. Plants well branched and free-flowering, commencing August 13. A true stock. Height 2½ feet; length of spike 14 inches.

113. Non plus ultra (R. Veitch).—A tall striped variety, with medium flowers of a rosy magenta shade, having the upper part of the lower lip deep crimson. The stems are chocolate-coloured and the leaves tinted with the same. Plants free-branching and very free-flowering, commencing about August 4. Stock pure. Height 2½ feet; length of spike 1 foot.

114. Orange King (J. Veitch).—A very brilliant variety. Flowers large, bright fiery orange red; outside of tube dull purple lake. Foliage, stems, and calyces tinted with light brown. Plants branch with great freedom from the base and flower profusely, beginning about August 13. One plant bore rose-pink flowers, and another those of the type with the outside of the tube sulphury white. Height 3 feet; length of spike 18 inches.

120. Perle d'Amour (Barr).—A very charming variety which came nearly true and commenced to flower about August 13. Flowers medium, deep rosy carmine, having the lower lip tipped with golden yellow. The outside of the tube is sulphury white. The stems, young leaves, and calyces are tinted with pale brown. Plants branch freely from the base and flower profusely. Height 3 feet; length of spike 14 inches.

121. Phyllis (Hayward).—Flowers small, sulphury white or a pale shade of purple rose in about equal numbers; in flower August 27. Height 3 feet; length of spike 13 inches

130. Purple King (Barr).—Flowers very large, deep French or reddish purple, with the outside of the throat deep carmine violet.

Foliage mostly tinted with chocolate. Height 2½ feet; length of spike 14 inches. In flower August 29.

131. Purple King (Heinemann).—Similar to No. 130.

135. Queen Victoria (J. Veitch), **A.M.** September 9, 1913.—Flowers large, pale sulphury white, lower lip tipped with yellow. Plants well branched and very free-flowering, commencing August 13. Stock pure. Height 3¼ feet; length of spike 18 inches.

136. Queen Victoria (R. Veitch).—Similar to No. 135, but not quite so large. Flowering commenced earlier, viz. August 4.

151. Salmon Pink (R. Veitch), **A.M.** September 9, 1913.—Flowers large, purple rose, lower lip slightly tipped with yellow; outside of tube white. Plants well branched from the base, foliage medium. A very charming variety, stock true, commencing to flower August 4. Height 3 feet; length of spike 17 inches.

154. Salmon Rose (J. Veitch).—A bright fiery-red variety, of large size, lower lip tipped with deep orange, outside of tube old rose. The stems are light brown in colour, and the broad leaves are tinted with the same at the margins. Plants well branched at the base, commencing to flower about August 4. Height 3 feet; length of spike 20 inches.

160. Snowflake (Barr).—Flowers medium, opening about August 13. Sulphury white, having the lower lip just tipped with yellow. Plants very free-flowering and uniform in height. Stock pure. Height 3½ feet; length of spike 16 inches.

161. Sulphur Fairy (Hayward).—Flowers large, deep sulphur yellow, deepening to chrome yellow in the upper part of the lower lip. Plants well branched from the base, very free-flowering, commencing about August 13. Several rogues appeared in this stock. Height 3 feet; length of spike 16 inches.

166. Tall Striped (Dobbie).—A fine mixed strain, comprising the following colours: deep yellow slightly streaked with dull crimson; sulphury white much streaked with dull crimson and having the lower lip tipped with yellow; deep crimson and old carmine red. In flower August 27. Height 2½ feet; length of spike 1 foot.

167. Tall Striped (R. Veitch).—Similar in character to No. 166 and comprising the following colours: yellow streaked with dull red; sulphury white, streaked crimson; violet rose, having the lower lip tipped with yellow. Plants well branched and flowering a little later than the preceding. Height 3 feet; length of spike 15 inches.

169. Venus (Bath).—Flowers large, upper lip rose, lower lip pale sulphur yellow except the lobes, which are pale rose, outside of tube sulphury white. Plants well branched from the base and very free-flowering, commencing about August 6. The colour varied considerably and several crimsons appeared. Height 3 feet; spike 16 inches.

170. Venus (Heinemann).—Similar to No. 169.

171. Venus (R. Veitch).—Similar to No. 169, but very variable indeed, including crimson and rosy magenta shades.

175. Victoria (R. Veitch).—A tall striped variety, having amber-white flowers blotched with purple garnet on the lower lip and suffused with bluish lilac on the upper. Some plants gave flowers varying somewhat from this. Plants well branched, commencing to flower about August 4. Height 3 feet; spike 15 inches.

176. Vulcan (Barr).—Flowers large, deep velvety crimson, with the outside of the throat plum violet. The stems are chocolate-coloured, while the broad foliage and the calyces are much tinted with the same. Stock quite pure. Height 3 feet; length of spike 15 inches.

186. Yellow King (Barr), **A.M.** September 9, 1913.—Flowers large, deep, clear primrose yellow, with chrome-yellow lower lip. The tube is sulphury white outside. Plants well branched; foliage dark green. Flowering began about August 13. Two rogues appeared in this stock. Height 3 feet; length of spike 16 inches.

192. Yellow Queen (Hayward).—Flowers large, primrose yellow, lower lip deeper, very effective. Plants well branched, flowering freely from August 4. Stock true. Height 3 feet; length of spike 15 inches.

Intermediate Section.

1. Albino (Heinemann), **XXX** September 9, 1913.—Flowers medium, sulphury white, suffused with rose at the margins and in the upper part of the lower lip, which is tipped with yellow. Plants freely branched from the base and very free-flowering, commencing about August 13. Stock true. Height 3 feet; length of spike 14 inches.

2. Album fl. pl. (R. Veitch).—Flowers exceptionally large, sulphury white, double on one plant only, lower lip tipped with yellow. Several rogues appeared bearing single flowers of various shades of rosy magenta. Plants vigorous, well branched at the base, in flower August 4. Height 2 feet; length of spike 1 foot.

3. Amber Queen (Barr), **A.M.** September 9, 1913.—A very compact grower, of uniform height. Flowers medium, gamboge yellow tinged with rose, especially in the upper lip; tube pale sulphur yellow outside. Plants well branched at the base, very free-flowering, commencing about August 4. A pure stock. Height 18 inches; length of spike 8 inches.

196. Amber Queen (Daniels).—Similar to No. 3.

4. Amber Queen (Watkins & Simpson), **A.M.** September 9, 1913.—Similar to No. 3.

5. Apple Blossom (Barr).—A compact grower which commenced to flower profusely about July 14. The foliage is long and narrow and the flowers large, white, suffused with very pale rose. The lower lip is tipped with deep primrose yellow. The plants branch freely at the base. One or two plants in this stock showed some variation in colour. Height 15 inches; length of spike 7 inches.

6. Art Shades (J. Veitch).—Foliage medium, green. Plants branched, free-flowering. Flowers large, of various colours, including

russet orange, old rose, pale carmine purple, and apricot. Commenced to bloom about July 28. Height 20 inches; length of spike 10 inches.

8. Aurantiacum (Simpson).—Quite a distinct stock from No. 7. Flowers medium, very variable in colour, ranging from pale yellow through deeper shades of the same to pale and bright orange. One plant bore rosy magenta flowers. Plants very free-flowering, well branched from the base, commencing to flower about August 4. Foliage medium. Height 18 inches; length of spike 9 inches.

197. Aurora (Daniels).—Flowers medium, fiery orange, having the lower lip tipped with golden yellow. Plants well branched from the base, flowering freely from August 13. Stock pure. Height 2 feet; length of spike 1 foot.

9. Aurora (Hurst).—Similar to No. 197, but coming into flower earlier. Two crimson rogues appeared.

10. Aurora (Simpson).—Similar to No. 197, but coming into flower earlier.

12. Beacon (J. Veitch), **A.M.** September 9, 1913.—Flowers, medium, deep vermilion red, having the lower lip tipped with orange and having the outside of throat sulphury white. The plants are very vigorous in growth, freely branched from the base, and flower with remarkable freedom, beginning about August 4. A very effective variety, every plant coming true. Height 2 feet; length of spike 1 foot.

14. Black Prince (Dickson & Robinson).—Flowers large, dark crimson; stems chocolate brown, leaves also much tinted with the same. A true stock, freely branching from the base and flowering freely from August 4. Height 2 feet; length of spike 1 foot.

15. Black Prince (Hurst).—Similar to No. 14.

16. Black Prince (Simpson).—Similar to No. 14.

17. Bonfire (Simpson), **A.M.** September 9, 1913.—Flowers medium, a lovely shade of coral red suffused with rose, and deepening to orange in the upper part of the lower lip. Plants wonderfully uniform in habit and height; bushy and well branched at the base, free-flowering, commencing about August 13. A very true stock. Height 2 feet; length of spike 1 foot.

18. Bonfire (Sydenham), **A.M.** September 9, 1913.—Similar to No. 17.

19. Bonfire (J. Veitch).—Similar to No. 17, but much earlier in flowering, commencing July 28.

20. Brilliancy (Bath).—Flowers large, saturnine red, lower lip tipped with golden yellow, outside of tube old rose. Plants well branched from the base, free-flowering, beginning August 4. Three plants in this stock bore pale rosy-orange flowers, with sulphury white outside to the tube. Height 22 inches; length of spike 1 foot.

24. Brilliant Rose (Bath), **XXX** September 9, 1913.—Flowers large, bright rosy pink, having the lower lip tipped with yellow. Plants not quite so freely branched as some, very free-flowering, commencing

about August 13. Two orange and one crimson rogue appeared in this stock. Height 22 inches ; length of spike 1 foot.

25. Brilliant Rose (Heinemann).—A very mixed stock, including shades of carmine purple, yellow, and crimson. Plants of varying heights.

26. Brilliant Vermilion Scarlet (Heinemann).—Flowers large, a deep shade of bright fiery red, having the outside of the tube deep lilac rose. Very effective. Plants well branched, commencing to flower about August 13. Thirteen per cent. crimson rogues appeared. Height 21 inches ; length of spike 10 inches.

28. Buff Queen (Bath).—Flowers large, upper lip pale Indian yellow suffused with rose, lower lip deep primrose yellow, outside of tube old rose. Plants very freely branched, and covered with flowers, which began to open about August 4. Some considerable variation in colour occurred in this stock, some plants bearing yellow and orange flowers, while one crimson-flowered plant appeared. Height 21 inches; length of spike 9 inches.

29. Buff Queen (J. Veitch).—Similar to No. 28, but quite true and more vigorous.

30. Buff Queen (Watkins & Simpson), **XXX** September 9, 1913.—Similar to No. 28, but later in flowering and a pure stock.

32. Canary Bird (Bath).—A very pretty variety, commencing to flower freely about July 14. The foliage is light green and very narrow. The flowers are large, pale sulphur yellow, with deep primrose-yellow lower lip. Two pale pink and one white-flowered plant appeared in this stock. The plants branch freely. Height 1½ feet; length of spike 10 inches.

33. Carmine (J. Veitch).—Foliage long and narrow, green ; flowers large, deep rose pink ; lower lip tipped with primrose yellow ; very free-flowering, commencing about July 14 ; branches freely from the base. This stock gave one plant bearing sulphury-white flowers. Height 2 feet; spike 1 foot.

35. Carmine King (Hurst).—Flowers medium, rich carmine; plants well branched and very free-flowering, commencing about August 4. Two plants bearing rosy-magenta flowers appeared in this stock. Height 2 feet; length of spike 1 foot.

36. Carmine Queen (Barr).—Flowers medium, carmine purple, lower lip tipped with orange. Plants branch freely from the base. Flowering began about August 4. A few orange rogues appeared in this stock. Height 20 inches ; length of spike 1 foot.

37. Carmine Queen (Watkins & Simpson), **A.M.** September 9, 1913. —Similar to No. 36, but a little earlier in flowering. A very pure stock.

38. Cerise Queen (Dickson & Robinson).—Flowers large, very light French purple, with the tube deep lilac rose outside. Four rogues appeared. Foliage (slightly), stems, and calyces tinted with light brown. Plants well branched, beginning to bloom about August 13. Height 21 inches; length of spike 10 inches.

39. Chamois (R. Veitch).—Flowers large, deep orange cadmium

shaded with rose, lower lip tipped with golden yellow; outside of tube sulphury white. Several rogues appeared, including two plants bearing crimson flowers, two rosy magenta, and one yellow. Plants well branched, flowering freely from August 4. Height 18 inches; length of spike 9 inches.

40. Coccineum (Dobbie).—Flowers large, bright fiery red, becoming deep orange cadmium in the upper part of the lower lip. The outside of the tube is deep lilac rose. Plants bushy and well branched, commencing to flower about August 13. Two rogues appeared. Height 20 inches; length of spike 10 inches. This variety was considered to be very similar to Vesuvius (p. 654).

41. Coccineum (Hurst), **A.M.** September 9, 1913.—Similar to No. 40, but a little deeper in colour.

42. Coral Red (Dickson & Robinson).—Flowers medium, deep rose Neyron red, having the lower lip tipped with deep yellow. The tube is sulphury white outside. The plants are well branched from the base, and commenced flowering profusely about August 11. This stock contained several rogues. Height 2 feet; length of spike 1 foot.

44. Coral Red (J. Veitch).—Similar to No. 42.

47. Cottage Maid (Barr), **A.M.** June 26, 1906.—Similar to No. 48 in colour, but measuring much less in height, being only 2 feet. Length of spike 1 foot.

50. Cottage Maid (Sydenham), **A.M.** June 26, 1906.—Similar to No. 47. This was the earliest stock of this variety to flower, commencing August 7.

34. Crimson King (Barr).—A splendid dark reddish crimson variety having the lower lip tipped with bronze. The plants branch freely from the base, and commenced to flower freely from August 4. Stock quite true. Height 2 feet; length of spike 1 foot.

55. Crimson King (Dobbie).—Flowers medium, dark crimson red, commencing to open about the middle of August. Foliage and stems tinted with chocolate brown. Plants branch freely from the base and bloom freely. Stock pure. Height 2 feet; length of spike 1 foot. This stock is quite distinct from No. 54 (p. 655).

56. Crimson King (Hurst), **A.M.** September 9, 1913.—Similar to No. 55, but coming into flower much earlier.

58. Dainty (Dickson & Robinson), **XXX** September 9, 1913.—Flowers medium, bright raspberry red, having the lobes of the lower lip lighter and the tip orange. The outside of the tube is sulphury white. Plants branch freely from the base, free-flowering, commencing about August 13. Two crimson rogues appeared. Height 2 feet; length of spike 1 foot.

59. Dainty Queen (Bath).—Flowers large, lower lip chrome yellow tinged with rose at the base, upper lip Indian yellow suffused with rose; outside of tube old rose. Foliage pale yellowish green. Plants well branched from the base and very free-flowering, commencing about August 4. Height 18 inches; length of spike 10 inches. Stock true.

60. Dainty Queen (Hayward).—Similar to No. 59.

61. Dainty Queen (Heinemann).—Similar to No. 59, but with a few variable plants.

62. Dainty Queen (Simpson).—A mixed stock, giving a lot of rose-pink flowers and normal foliage. 65 per cent. of the plants were similar to No. 59.

63. Dainty Queen (Sydenham), **XXX** September 9, 1913.—A pure stock, similar to No. 59.

64. Daphne (Bath).—Flowers large, pale rosy carmine, having the outside of the tube, the upper part of the lower lip, and the middle lobe of the same sulphury white. The plants are vigorous, branch freely from the base, and produce a wonderful profusion of well-flowered spikes, which began to open their flowers about August 4. Stock true. Height 22 inches; length of spike 1 foot.

65. Daphne (Dickson & Robinson).—Similar to No. 64, but coming into flower later.

66. Daphne (Hayward).—Similar to No. 64, but coming into flower later.

67. Daphne (Hurst), **A.M.** September 9, 1913.—A good, pure stock. Similar to No. 64.

68. Daybreak (Bath).—A very striking variety. Flowers large, bright fiery red, with upper lip cherry red. The lower lip is tipped with orange yellow, and the outside of the tube is sulphury yellow. Plants bushy and very freely flowering, beginning about August 13. A very pure stock. Height 20 inches; length of spike 10 inches. Considered synonymous with Beacon.

69. Defiance (Bath), **A.M.** September 9, 1913.—Flowers large, deep fire red, tube old rose outside. The plants branch well from the base and flower very freely, commencing about August 4. Foliage medium. A very effective and showy variety. Stock pure. Height 22 inches; length of spike 10 inches.

198. Defiance (Daniels).—Similar to No. 69, but not quite so intense in colour.

70. Defiance (Heinemann).—Similar to No. 69.

71. Defiance (R. Veitch).—A very mixed stock, giving a very small percentage of flowers true to type. Most of the plants produced flowers of varying shades of crimson, while some gave cerise. Flowering commenced about August 4. Height 2 feet; length of spike 10 inches.

72. Delicata (Bath).—This stock produced freely-branching plants with medium foliage. The flowers were of various colours, including white, light and deep pink, and a very pale salmon. They commenced to open about July 28. Height 18 inches; length of spike 8 inches.

200. Dreadnought (Daniels).—Flowers medium, rich deep velvety crimson, commencing to open about August 4. The flower stems are chocolate-coloured, and the leaves are tinted with the same shade. The plants branch well from the base and flower with wonderful

freedom. Stock true. One of the darkest varieties on trial. Height 20 inches; length of spike 9 inches.

199. Fairy Queen (Daniels).—Flowers medium, pale carmine purple, having the middle lobe of the lower lip white and the tip of the same yellow. The outside of the tube is white, and the flowers are produced in great abundance. The plants are freely branched at the base. Flowering commenced about August 4. Stock true. Height 2 feet; length of spike 1 foot. Quite distinct from No. 75.

77. Firefly (Dickson & Robinson).—Flowers medium, fiery red, with the outside of the tube sulphury white, lower lip tipped yellow. Plants bushy, commencing to flower profusely about August 13. A pure stock. Height 22 inches; length of spike 10 inches.

78. Firefly (Simpson).—A compact grower, branching and flowering freely. Flowers medium, dark crimson red, having the outside of the tube amber white. Foliage, medium, green. The colour was somewhat variable, and one plant gave deep yellow flowers. Commenced to bloom about July 28. Height 21 inches; length of spike 9 inches. Distinct from No. 77.

80. Fire King (Bath), **A.M.** September 9, 1913.—Flowers large, cherry red in the upper lip, and fiery orange in the lower, which is tipped with yellow. The outside of the tube is sulphury white. The plants are bushy, well branched at the base, and very uniform in height. A very striking colour. Stock very pure. In flower August 4. Height 2 feet; length of spike 1 foot.

81. Fire King (Heinemann).—Considerably lighter in colour than No. 80, but otherwise similar. Requires more selection.

82. Firelight (Bath), **XXX** September 9, 1913.—Flowers large orange deeply suffused with rose, lower lip tipped with deep golden yellow, outside of tube dark old rose. Plants well branched, free-flowering, beginning about August 4. Height 22 inches; length of spike 10 inches.

195. Flame (Bath).—A very effective variety, having large flowers, bright fiery red in colour, with the outside of the tube dull carmine purple; very free-flowering in habit, beginning about August 13. Plants branch well from the base. Stock very pure. Height 21 inches; length of spike 1 foot.

84. Gipsy Queen (Dickson & Robinson).—Flowers large, deep velvety crimson, having the outside of the tube sulphury white and the lower lip tipped with orange. The calyces are chocolate, and the stems and leaves are slightly tinted with the same. Plants free-flowering, commencing August 13, and branching freely from the base. A pure stock. Height 2 feet; length of spike 14 inches.

85. Gloriosa (Bath).—A very showy variety, throwing an abundance of bold spikes, which began to open their flowers about August 4. Colour rich carmine. The middle lobe of the lower lip is much lighter than the prevailing shade, and the outside of the tube is sulphury white. The plants are wonderfully strong and well branched from the base. Height 2 feet; length of spike 1 foot.

86. Gold Crest (Carter).—A beautiful reddish-chrome variety, of medium size, tinged with rose pink, outside of tube old rose, lower lip tipped golden yellow. Plants sturdy, flowering from August 2. A pure stock. Height 22 inches; length of spike 1 foot.

87. Golden Fairy (Bath).—This stock produced a very wide range of colours, including crimson, rosy magenta, rose pink, and yellow suffused with rose. The foliage in some cases was pale, and the heights varied considerably. Flowering began about August 4. Average height 2 feet; length of spike 10 inches.

202. Golden Morn (Daniels).—Flowers medium, golden yellow suffused with rose, which colour also appears on the outside of the throat in a deep shade. Lower lip deep lemon yellow. A true stock, branching freely from the base and beginning to flower freely about August 4. Foliage medium. Height 2 feet; length of spike 1 foot.

88. Golden Morn (J. Veitch).—Similar to No. 202.

89. Golden Morn (Watkins & Simpson), **A.M.** September 9, 1913.—Similar to No. 202.

90. Golden Queen (Bath), **A.M.** September 9, 1913.—Flowers large, deep sulphur yellow, with deeper lower lip. Plants freely branched from the base, free-flowering, commencing first week in August. A true stock, with broad foliage. Height 2 feet; length of spike 1 foot.

201. Golden Queen (Daniels).—Similar to No. 90 in flower, but not so compact in habit, and having much narrower foliage. It commenced to flower a little earlier.

91. Golden Queen (Dickson & Robinson).—Similar to No. 90, but commenced flowering much later. A pure stock.

92. Golden Queen (Simpson).—Similar to No. 201.

97. Inspiration (Hayward).—A variable stock, producing mostly strong, well-flowered spikes of sulphury white, solferino red and rose blooms of medium size. Plants well branched, free-flowering, beginning about August 4. Height 2 feet; length of spike 1 foot.

98. Iris (Hayward).—A very vigorous variety, producing exceptionally large, bushy, and well-branched plants with long, narrow foliage, which, when young, is tinted with chocolate, which colour is noticeable also in the flower stems and calyces. Flowers rather small; the upper lip is pale reddish purple, which becomes suffused with yellow at the margins, while the upper part of the lower lip is fiery red tipped with orange, and the lobes below are like the upper lip, but more suffused with yellow. Flowering from August 13. Stock very mixed. Height variable, but averaging 18 inches; length of spike 7 inches.

99. King Alfred (Hayward).—Flowers medium, of various colours, including rosy magenta, dull purple lake, crimson and sulphury white. The plants branch from the base with remarkable freedom, and make fine specimens with medium foliage. Free-flowering, commencing August 4. Height 2 feet; length of spike 11 inches.

103. Marjorie (Hayward).—Flowers small, primrose yellow, sulphury white, crimson, and violet rose. A very mixed stock in habit and colour, several of the plants being quite dwarf. Flowering late at the end of August. Average height 2 feet; length of spike 10 inches.

104. Maize Queen (Dobbie), **A.M.** September 9, 1913.—A very pure stock, uniform in height and colour; flowers large, primrose yellow, suffused, in the upper lip especially, with rose, thus giving the impression of maize yellow; outside of tube old rose. The plants are vigorous and freely branched from the base. They flowered with great freedom from August 4. Height 2 feet; length of spike 1 foot.

105. Maize Queen (Simpson).—Similar to No. 104, but not so vigorous in growth.

106. Maize Queen (J. Veitch).—A good stock, similar to No. 104.

108. Mixed (Forbes).—A mixed strain, producing large flowers of varying shades of yellow, salmon, and purple garnet, most of which were streaked or spotted with crimson. Plants well branched and free-flowering, beginning about August 4. Height 22 inches; length of spike 11 inches.

109. Mixed (Forbes).—Similar to No. 108.

110. Mont Blanc (Barr).—Foliage narrow, green; flowers creamy white, lower lip tipped with deep yellow; size medium. The plants are of erect habit, and began to flower about July 14. Height 18 inches; length of spike 8 inches.

112. Nobile (Hurst), **XXX** September 9, 1913.—Flowers rather small, white suffused with reddish violet, and having the upper half of the lower lip dark crimson. This stock was very uniform in height, but showed considerable variation in colour, several crimson and yellow-flowered plants being produced. Flowering commenced about August 4. Plants freely branched. Height 2 feet; length of spike 1 foot.

115. Orange Prince (Barr).—Flowers large, bright orange tinted with rose and having the very deep lower lip tipped with golden yellow, and the tube amber white outside. Plants dwarf and compact, freely branching, and blooming profusely from July 28. Foliage medium. A pure stock. Height 18 inches; length of spike 7 inches.

116. Orange Prince (Simpson).—Similar to No. 115.

117. Orange Prince (Sydenham).—Similar to No. 115.

118. Orange Queen (Dobbie).—A very pure stock. Flowers large, orange suffused with rose, the lower lip having its upper part deep yellow; the outside of the tube is old rose. The plants branch freely from the base and flower with remarkable freedom, beginning August 4. Height 2 feet; length of spike 1 foot.

119. Orchidæflorum (Bath).—This stock produced a great variety of colours, including primrose yellow, deep rosy magenta, light rose, and salmon pink. The habit was also variable, some being very dwarf, but the majority were of medium height, well branched and

free-flowering, commencing about July 28. Foliage narrow, green. Average height 18 inches; length of spike 1 foot.

122. Pink (J. Veitch), **A.M.** September 9, 1913.—A very effective variety, having medium-sized flowers of a charming shade of bright rosy carmine. The plants branch from the base and flower with great freedom, commencing about August 6. A very pure stock. Height 2 feet; length of spike 1 foot. The Committee thought Carmine would be a more appropriate name.

123. Pink and Terra-cotta Shades (Barr).—This stock produced good, strong, freely-branching plants, with medium green leaves. The flowers covered a wide range of colours, including white, rose pink, cerise, orange, and crimson. Flowering began about July 28. Height 2 feet; length of spike 1 foot.

124. Pink and Terra-cotta Shades (Sydenham).—A mixed strain, containing many shades of pink and terra-cotta. Flowers medium; plants well branched at the base; foliage medium. Flowering began about August 4. Height 2 feet; length of spike 1 foot.

125. Pink Beauty (Barr).—This stock produced very weak plants with pale yellowish foliage and deep cerise flowers, having the lower lip just tipped with yellow. Flowering was very weak, and commenced about August 4. Height 18 inches; length of spike 8 inches.

203. Pink Beauty (Daniels).—A pure stock. Flowers medium, pale cerise, having the outside of the throat white, and the lower lip tipped with golden yellow. Foliage medium; plants well branched from the base, free-flowering. Commenced to bloom about August 4. Very uniform in height, 20 inches; length of spike 1 foot.

126. Pink Beauty (Watkins & Simpson), **XXX** September 9, 1913.—With two exceptions, all the plants of this stock gave flowers having the outside of the tube pale cerise, but otherwise similar to those of No. 203.

127. Pink Pearl (Barr).—A very mixed stock, comprising shades of rosy carmine, reddish orange, and yellow. The type appeared to be rather small in size, amber white edged with pale madder carmine. The upper part of the lower lip is rosy salmon, tipped with yellow. The stems, young foliage, and calyces are tinted with light brown. The plants branch freely from the base and flower abundantly, beginning about August 13. Height 2 feet; length of spike 1 foot.

128. Pink Queen (Watkins & Simpson), **XXX** September 9, 1913.—Flowers large, rose pink, having the lower lip tipped with deep lemon yellow; plants vigorous, well branched at the base, and very free in flowering, commencing about August 4. A very true stock. Height 20 inches; length of spike 1 foot.

129. Pink Rose (Heinemann).—This stock gave a great diversity of colour, ranging from white through shades of pink and orange salmon to dark crimson. The flowers were mostly large and borne on well-branched plants, which began to bloom about August 13. Height 22 inches; length of spike 10 inches.

204. Purity (Daniels).—Flowers large, sulphury white, having the

lower lip tipped with yellow. The foliage is broad, and the plants branch freely from the base and commenced to bloom profusely about August 2. Several plants gave deep yellow flowers, while others were quite dwarf in habit. Average height 18 inches; spike 1 foot.

205. Queen Mary (Daniels).—Flowers medium, rich rosy carmine, having the lower lip tipped with orange yellow. Plants well branched at the base, commencing to flower very freely about August 13. Habit compact. Two rogues appeared bearing reddish-orange flowers. Height 18 inches; length of spike 9 inches.

132. Queen of the North (Barr).—Flowers medium, palest greenish white, produced freely in bold spikes. The plants are compact in growth, very freely branched, and have long and narrow green leaves. This stock gave 16 per cent. plants bearing rosy magenta flowers. Flowering commenced about August 13. Height 2 feet; length of spike 1 foot.

133. Queen of the North (Hayward).—Similar to No. 132, but coming into flower much earlier, on July 28. Stock quite pure and more vigorous than No. 132.

134. Queen Victoria (Barr).—A good white-flowered variety, commencing to bloom about July 28. Plants vigorous in growth, freely branched, free-flowering. Foliage medium, green. Flowers large, borne in bold spikes. One rogue bearing deep rosy magenta flowers appeared in this stock. Height 22 inches; length of spike 10 inches. Quite distinct from Nos. 135 and 136.

137. Red Riding Hood (Barr).—A variable strain, mostly rosy magenta, with the upper portion of the lower lip white. Some plants bore white and pale pink flowers. Foliage long and narrow. Plants branch freely from the base and began to flower about August 4. Height 18 inches; length of spike, 8 inches.

138. Rose Dorée (Barr).—Foliage medium, green; flowers large, carmine purple, having lower lip tipped with yellow, very effective. The plants began to bloom about July 28, and branched freely from the base. A pure stock. Height 22 inches; length of spike 1 foot.

139. Rose Dorée (Simpson).—Similar to No. 138, but not quite so pure a stock.

140. Rose Dorée (Sydenham).—Similar to No. 138, but not quite so pure a stock.

141. Rose Queen (Bath).—Plants freely branched, of vigorous habit, with medium green foliage. Flowering commenced about July 28, and the colours included shades of rose pink, cerise, pale apricot, and white. The flowers were mostly of large size. Height 2 feet; length of spike 10 inches.

142. Rose Queen (Simpson).—Flowers medium, rose pink, having the lower lip tipped with yellow. The plants branch freely from the base, and produce a large number of well-furnished spikes. The leaves are medium and green. Flowering began about July 28. Practically a true stock. Height 22 inches; length of spike 1 foot.

143. Rose Queen (Watkins & Simpson).—Similar to No. 142

144. Rose Superbe (Barr).—A very pretty variety, producing medium flowers, pale carmine purple in colour, having the tip of the lower lip golden yellow. The foliage is medium, green, and flowering began about July 28. The plants are branched and very free-flowering. A few plants carried flowers slightly paler than those of the majority. Height 22 inches; spike 1 foot.

146. Roseum superbum (Heinemann).—A free-flowering variety, branching freely from the base, and beginning to bloom about July 28. Foliage medium, green; flowers medium, deep pink, having lower lip tipped with lemon yellow. Stock not quite pure. Height 2 feet; length of spike 14 inches.

147. Roseum superbum (Simpson).—Similar to No. 146.

206. Rosy Morn (Daniels).—Flowers large, deep rose pink, having the lower lip tipped with deep yellow. Plants freely branched from the base; foliage medium. Flowering began about August 4. Stock true. Height 2 feet; length of spike 1 foot.

148. Rosy Morn (Dickson & Robinson).—Similar to No. 206, but later in flowering.

149. Rosy Morn (Watkins & Simpson), **A.M.** September 9, 1913.—Similar to No. 206. A pure stock.

150. Ruby (Barr).—Flowers medium; upper lip deep rose, lower lip carmine tipped with yellow, outside of tube pale old rose; in flower end of August. Height 2 feet; length of spike 1 foot.

152. Salmon Queen (Carter).—Flowers large, salmon pink, tinged orange, having the lower lip deep orange tipped with golden yellow, and the outside of throat deep rose, a very pretty combination. Flowering commenced about August 4. The foliage is medium, and the plants branch freely from the base, forming nice bushy specimens and blooming with wonderful freedom. True stock. Height 2 feet; length of spike 1 foot.

207. Salmon Queen (Daniels).—Similar to No. 152.

153. Salmon Queen (Heinemann).—Similar to No. 152, but containing several rogues bearing crimson, pink, and chestnut red flowers respectively.

155. Scarlet Beauty (Dickson & Robinson).—Flowers large, brilliant cardinal red, having the outside of the tube deep violet rose. Plants branched freely from the base, and flowered profusely from August 13. Three crimson rogues (12 per cent.) appeared, but otherwise the stock was very uniform in character. Very showy. Height 20 inches; length of spike 10 inches.

156. Scarlet Carmine (Dickson & Robinson), **XXX** September 9, 1913.—Flowers large, of a charming pale strawberry-red shade, with the lower lip much deeper and just tipped with yellow. Plants well branched and free-flowering, commencing about August 13. Foliage broad. Four rogues appeared in this stock, bearing much paler flowers, with the outside of the tube sulphury white. Height 2 feet; length of spike 1 foot.

157. Scarlet Flame (Carter).—Flowers large, bright fiery red, with

the upper lip paler and approaching russet orange. The outside of the throat is deep lilac rose. Plants compact, very uniform in height and habit, well branched from the base, and commencing to flower freely about August 13. A true stock. Height 20 inches; length of spike 1 foot.

158. Scarlet King (Simpson).—Foliage medium, green. Flowers large, purple garnet, commencing to open about July 21. The plants branch very freely from the base and bloom freely. Stock true. The lower lip is tipped with bronze. Height 20 inches; length of spike 8 inches.

159. Scarlet King (Sydenham).—Similar to No. 158.

162. Sunset (Barr).—Flowers medium, of a lovely red-orange shade, suffused with rose in the upper lip; outside of tube old rose. Plants well branched at the base, very free-flowering, commencing about August 4. Stock true. Height 2 feet; length of spike 1 foot.

163. Sunset (Bath).—This stock gave a great diversity of colour, quite distinct from No. 162, and including deep rose pink, pale pink, deep sulphur yellow, bronze yellow, and shades of orange. The blooms were in all cases large, and the plants flowered very freely, commencing about July 14. The plants branch freely from the base, and the foliage is green, long and narrow. Height 22 inches; length of spike 10 inches.

164. Sunset (Dickson & Robinson), **A.M.** September 9, 1913.—Quite distinct from Nos. 162, 163, and 165, being dwarfer, compact and bushy in habit, and bearing large flowers, of which the upper lip is mostly dull garnet, with patches of yellow near the margin. The sides of the lower lip are dull reddish garnet, while the lobes are bright lemon yellow, deepening to golden yellow at the tip of the lip. Flowering began about August 13, and two rogues appeared. Height 18 inches; length of spike 8 inches.

165. Sunset (Hurst).—Similar to No. 162.

168. The Bride (Sydenham).—Flowers small, white, having the lower lip tipped with primrose yellow. Plants very bushy and compact, commencing to flower freely about August 13. Twenty-five per cent. of the plants of this stock gave rosy magenta flowers. Height 18 inches; length of spike 8 inches.

172. Vesuvius (Simpson).—Foliage of medium size and width, green; flowers raspberry red, with bright fiery red lower lip, tipped with golden yellow, very effective. The plant branches moderately, but is not such a free bloomer as some. Flowering commenced about August 4. Height 2 feet; length of spike 1 foot. A pure stock.

173. Vesuvius (Sydenham).—A pure stock, similar to No. 172.

174. Vesuvius (J. Veitch).—Similar to No. 172, but coming into flower earlier, on July 21.

177. White (J. Veitch).—Flowers small, white, having the lower lip faintly tipped with yellow. Plants very bushy and compact in habit, coming into flower at the end of August. Height 2 feet; length of spike 1 foot.

178. White Beauty (Dobbie), **A.M.** September 9, 1913.—A very pure stock, of uniform height, flowering with wonderful freedom from August 6. Flowers medium, sulphury white. The plants branch well at the base, and form very nice, compact specimens. The foliage is narrow. Height 2 feet; length of spike 1 foot.

180. White Queen (Bath).—Flowers large, palest sulphury white, borne profusely on bold spikes; foliage medium, green. The plants are vigorous in growth, branch freely, and began to bloom about July 28. Two rogues appeared in this stock, the flowers of one being pale salmon old rose and of the other bright fiery orange. Height 18 inches; length of spike 8 inches.

182. White Queen (Dobbie), **A.M.** September 9, 1913.—Flowers very much larger than those of No. 180, and with more primrose yellow in the upper part of the lower lip. Plants very strong and vigorous, branching freely from the base and flowering well from August 13. A fine and pure stock. Height 2 feet; length of spike 1 foot.

184. White Queen (Simpson).—Flowers small, white, having the lower lip tipped with sulphur yellow. Plants dwarf, well branched from the base, flowering profusely from August 13. Four rosy magenta rogues appeared. Height 20 inches; length of spike 10 inches.

185. Yellow (J. Veitch), **A.M.** September 9, 1913.—Flowers medium, very bright primrose yellow, deepening to chrome-yellow in the upper part of the lower lip. Plants dwarf and compact in habit, flowering very freely from August 6. Foliage narrow. A true stock. Height 16 inches; length of spike 8 inches.

190. Yellow Queen (Barr).—Flowers large, primrose yellow, lower lip deeper, very effective. Plants well branched, flowering freely from August 4. Stock pure. Height 2 feet; length of spike 1 foot.

191. Yellow Queen (Dobbie).—Similar to No. 190.

193. Yellow Queen (Hurst), **A.M.** September 9, 1913.—A very pure and vigorous stock, similar to No. 190.

194. Yellow Queen (Sydenham).—Similar to No. 190.

Dwarf or Tom Thumb Section.

54. Crimson King (Carter).—Flowers large, dark velvety crimson, commencing to open about August 6. Plants dwarf and compact in habit. A pure stock. Height 1 foot; length of spike 6 inches.

57. Crimson King (Hurst).—Flowers small, rich crimson, opening about August 13. Plants spreading and very free-flowering. Stock very pure. Height 9 inches; length of spike 5 inches.

73. Delila (Carter).—Flowers large, bright rosy magenta, having the lower lip tipped with bright yellow. The outside of the tube is sulphury white. The plants are very spreading and well flowered, commencing about August 13. Four tall rogues, of varying colours, appeared. Height 8 inches; length of spike 4 inches.

76. Firefly (Carter).—Flowers large, upper lip bronze tinged with rose, lower lip mostly deep yellow; outside of tube sulphury white.

Plants very spreading and free-flowering, commencing about August 13. Stock true. Height 8 inches; length of spike 4 inches.

102. Little White Gem (Barr).—A pretty dwarf white-flowered variety, of compact growth, commencing to bloom August 8. Two tall rogues, bearing rosy magenta flowers, appeared. Height 1 foot; length of spike 7 inches.

145. Roseum (Carter), **XXX** September 9, 1913.—Flowers large, pale lilac rose, lower lip tipped with yellow. The outside of the tube is deeper in colour, approaching pure mauve. A very pure stock. Plants 10 inches high, compact in habit, with dark green foliage. In flower August 6. Length of flower spike 6 inches. The colour is quite a new one in the dwarf section and was very much admired.

179. White Prince (Barr).—Sixty-six per cent. of the plants of this stock were dwarf and compact, with large primrose-yellow flowers, while the remainder were of medium height, with creamy-white flowers, having a blotch of pale amaranth red below the yellow tip on the lower lip. Plants well branched from the base, commencing to flower about August 4. Height 10 inches; length of spike 6 inches.

181. White Queen (Carter).—A dwarf and compact variety, with large sulphury-white flowers, having the lower lip tipped with yellow. Five tall rogues appeared in this stock. Height 8 inches; length of spike 4 inches.

183. White Queen (Hurst), **XXX** September 9, 1913.—Similar to No. 181, but more vigorous and coming into flower earlier. Two tall crimson rogues appeared in this stock.

187. Yellow Prince (Carter).—Dwarf and compact in habit; flowers large, primrose yellow, commencing to open August 6. Very free-flowering. Height 8 inches; spike 6 inches.

188. Yellow Prince (Dobbie).—Similar to No. 187, but opens earlier.

189. Yellow Prince (Hurst), **XXX** September 9, 1913.—Similar to No. 187.

DECORATIVE GARDEN DAHLIAS, AT DUFFRYN, NEAR CARDIFF,

ON BEHALF OF THE ROYAL HORTICULTURAL SOCIETY AND THE NATIONAL DAHLIA SOCIETY.

By the kindness of Mr. Reginald Cory these trials took place in his charming grounds at Duffryn to demonstrate the value of the Dahlia as a Decorative Garden subject, and with this end in view all the raisers in this country, and some on the Continent, were invited to send plants of every section of the flower they deemed to be valuable as Decorative Garden plants. The response was far in excess of all anticipations, for nearly a thousand distinct varieties were sent in, some as pot roots, others as green plants, the whole number mustering between seven and eight thousand plants, truly a gigantic total; and when it is remembered what an important thing it is to make an early start and grow on without a check, so as to ensure early flowering, one can imagine how this vast number must have taxed even the glass resources of Duffryn, especially as the majority of the plants were potted on as they required it into six, seven, and eight inch pots. The trial was quite unique, inasmuch as it differed from the row-after-row type of trial, for they were planted in a series of gardens, in beds, on borders, as bank plants, and even as "dot" plants for summer bedding. The various sections were planted together as far as possible, while the shades of colouring were also associated harmoniously; the varying height of the plants was also studied, the whole producing an effect absolutely different from the usual trials of such plants. The cultural details were more simple, for the soil appeared to be a good holding loam, which had been deeply cultivated, a light dressing of pit manure applied, and at planting time each plant was placed in a station of sifted potting mould. The necessary support to the plant was a single stake, to which the growths were looped up; thinning out or disbudding was strictly forbidden, so that all the varieties in their respective sections were on the same plane. This briefly sums up the cultivation of the plants in this trial, except of course the watering of the plants necessitated by the dry season during their growing period, which was never neglected, needless to add, with the result that when visited by the Joint Committee of the two Societies on September 3 and 4 they presented a glorious display, which called for unanimous thanks to Mr. Cory and for unstinted admiration of the excellent results achieved.

The Cactus section was the largest in point of numbers, there being approximately two hundred and fifty varieties. They were, however, in the opinion of the Committee the least satisfactory section, for

numbers of them did not possess the least value as Decorative Garden plants. As a consequence only thirty-three were considered worthy of award. It should be added, however, that other varieties would no doubt improve at a later date.

Next in importance, as far as numbers are concerned, were the Pæony-flowered varieties. These were represented by about two hundred varieties, and as a mass of colouring they were exquisite, but their unequal heights rather told against them, as far as the general effect was concerned. This could be avoided if the seasons could only be gauged, as the growth of individual varieties depends so much on the weather. This trial, however, demonstrated quite clearly that the newer forms possess better stems and more lasting flowers than the earlier varieties. Thirty-two varieties secured the approval of the Committee.

The Collarette section was represented by about one hundred and fifty varieties, a formidable list for such a late aspirant to public favour; still, at the date of inspection they produced the greatest impression, for they were literally masses of flower, due doubtless to their free-flowering propensities, shy varieties being quite rare in their ranks. However, only twenty-three varieties were honoured.

The Decorative section is very difficult to define, consisting as it does at the present time of all those varieties which cannot be placed in any other recognized section, and in this trial many large-flowering varieties had been sent, which would be handsome for vase decoration, but, as Garden Decorative plants, belied their description. Many were evidently late-flowering varieties, and quite unsuitable for such a trial. Nearly a hundred varieties were represented, but only twelve met with approval.

The Single section produced a fine effect with about a hundred varieties, and at the time of inspection were quite in their best form. Sixteen varieties were recommended by the Committee.

The Pompon varieties were represented by about sixty varieties, and were much admired for their decorative effect. These little Lilliputians had, however, overgrown their allotted space and, unlike the other sections, were somewhat crowded. Nevertheless they secured twenty-six recommendations, the highest percentage in the whole trial, except in the minor sections.

The Show and Fancy varieties totalled fifty, and some of them, though somewhat formal when compared with other sections, were undoubtedly highly decorative as garden plants, and ten varieties (most of them old ones) secured the necessary number of marks for an award.

The Pompon or Miniature Cactus varieties found the soil at Duffryn much too congenial for their requirements, and in most cases had produced flowers beyond their normal size. Five varieties, however, were recommended out of a total of twenty-five entrants.

The section entered as Bedding varieties was rather misleading, as it included nearly all the types; the five, however, selected by the

Committee were all excellent in their respective classes, though there were plenty of forms in the other sections that would be equally well placed under this category.

The Mignon section was quite a small collection, but a very noteworthy one, the flowers single, and growing about eighteen inches high, with bright, well-defined colours, each flower carried erect, a very fine section for bedding or massing purposes.

The Giant Single varieties did not meet with favour, for, although their individual flowers are handsome, they appear to lack the freedom so essential to decorative garden plants.

While the Star Dahlias did not on this occasion secure the support of the Committee, they certainly produced a blaze of colour in the garden, though of a somewhat bizarre character.

The Parisian Singles and Anemone types were not, as a whole, sufficiently advanced in growth to judge of their merits, with one exception. The Continental varieties arrived so late that they had made little growth, and were not in flower on September 3.

The following varieties were chosen as most worthy of notice for GARDEN DECORATION:—

LIST OF VARIETIES MOST DESIRABLE FOR GARDEN DECORATION.

Cactus Varieties.

Amos Perry (**Hobbies*—Cory).—Velvety crimson, very free-flowering, 3 feet.

Arthur Pickard (*Stredwick*—Dobbie).—Pale pinkish-salmon, fine habit, 5 feet.

Bridal Crown (*Mortimer*).—Yellow shaded pink, 4 feet.

Conquest (*West*—Campbell).—Deep crimson-maroon, very erect, 4 feet.

Duchess of Marlborough (*Cheal*).—Delicate silvery-pink, fine habit, 4 feet.

Edith Carter (*Shoesmith*).—Yellow, heavily suffused rosy carmine, 4 feet.

Effective (*Hobbies*).—Amber with rose centre, 4 feet.

Floradora (*Humphries*—Hobbies).—Rich crimson, long wiry stems, 3 feet.

Glow (*West*—Hobbies).—Yellow tipped apricot, 3 feet.

Hon. Mrs. Greville (*Cheal*).—Orange-yellow, suffused salmon, 4½ feet.

Jeanne Hardy (*Cayeux & Le Clerc*).—Rose carmine and white, 4 feet.

Mabel Needs (*Mortimer*).—Orange scarlet, shaded plum, 3½ feet.

Mrs. J. Barker (*Mortimer*).—Salmon-pink, 2½ feet.

Mrs. J. S. Brunton (*Mortimer*).—Deep yellow, 4 feet.

* The name printed in italics is that of the reputed raiser or introducer. For this list of raisers' names we are indebted to Mr. W. CUTHBERTSON, J.P., F.R.H.S. Where the sender was not also the raiser, his name is printed in roman type. In a few cases the raiser's name has not been ascertained.

Mrs. D. Fleming (*Stredwick*).—Fine white, 3½ feet.

Mrs. Chas. Foster (*Cheal*).—Rich rose-pink, 3½ feet.

Mrs. J. Goddard (*Cheal*).—Glowing crimson, 3½ feet.

Mrs. Landale (*Cheal*).—Yellow, suffused and edged bright rose, 4 feet.

Mrs. Macmillan (*Stredwick*—Dickson).—Centre white, deepening to mauve, 4 feet.

Mrs. F. Paton (*Cheal*).—Brilliant crimson-scarlet, 4 feet.

Nimrod (*Mortimer*).—Bright pink, tinted lemon, 2½ feet.

René Cayeux (*Cayeux & Le Clerc*).—Scarlet, 2½ feet.

Rev. M. Limon (*Treseder*).—Rich bronzy-yellow, 3 feet.

Snowdon (*Stredwick*—Campbell).—Pure white, 5 feet.

Sportsman (*Shoesmith*).—Fine scarlet, 5 feet.

Stability (*Stredwick*).—Rose-pink, 3 feet.

Star (*Stredwick*—Carter Page).—Bright bronze-yellow, 4 feet.

Sweet Briar (*Stredwick*—Carter Page).—Clear pink, 4 feet.

Sweetheart (*Keynes*—Dickson).—Salmon-pink, 4 feet.

Thos. Parkin (*Stredwick*—Hobbies).—Bright orange, 3 feet.

Victory (*Mortimer*—Cheal).—Rich coral.

Vivid (*T. S. Ware*).—Orange-scarlet.

West Hall Scarlet (*Baxter*—Mortimer).—Bright scarlet, 3 feet.

W. H. Treseder (*Treseder*).—Pale yellow, shading to pink at ends of petals.

Pompon Cactus Varieties.

Coronation (*Keynes*—Carter Page & Dobbie).—Glowing red, very free, 3 feet.

Firefly (*Cheal*).—Brilliant scarlet, tipped yellow.

Gracie (*Went*—Cory & Dickson).—Yellow and amber, tipped white, 3 feet.

Magenta Queen (*Dickson & Robinson*).—Deep magenta, 3 feet.

Miss Hicks (*Dickson & Robinson*).—Rich crimson, 3 feet.

Selma (*Cheal*).—Rich rosy purple, 3 feet.

Single Varieties.

Brilliant (*Cheal*).—Rich crimson-scarlet, yellow zone, 4 feet.

Cardinal (*Cheal*).—Rich cardinal red, yellow disc, 3½ feet.

Circe (*Cayeux & Le Clerc*).—Centre of petals white, broadly margined pink, 2 feet.

Crimson King (Dickson).—Rich crimson, 3 feet.

Elsie (*Cheal*).—Purplish-crimson, edged white, 3½ feet.

Fuji San (*Cheal*—Dobbie).—Rich orange-yellow, crimson zone, 3½ feet.

Kitty (*Cheal*).—Rosy mauve, chocolate disc, 3 feet.

Little Othello (*Cannell*—Cory).—Crimson, black centre, with ring of prominent yellow stamens, 2 feet.

Mary (*Dickson & Robinson*).—Salmon with crimson ring, 2 feet.

Mikado (*Seale*—Dickson).—Scarlet centre, heavily margined, clear yellow, 3 feet.

Mrs. W. Hood (*Seale*—Dobbie).—Pure yellow, 3 feet.

Ouida (Dickson).—Orange-salmon, shaded rose-pink, 3 feet.

Owen Thomas (*Cheal*).—Crimson-scarlet, heavily tipped golden-yellow, 4 feet.

Rosy Gem (*Dickson & Robinson*).—Pure rose with crimson ring, 3 feet.

Rosemary Bridge (*Cheal*).—Deep rich rose, lighter shade on margin, 3 feet.

Union Jack (*Turner*).—White-striped scarlet, 2 feet.

Winona (*Cheal*).—Deep maroon, 3 feet.

Bedding Varieties.

Barlow's Bedder (*Ware*).—Glowing orange-scarlet, 2½ feet.

Cloth of Gold (*Turner*).—Clear yellow, show type.

Glückhauf (*Goos & Koenemann*—Dobbie & Carter Page).—Bright orange-scarlet, 2½ feet.

Rising Sun (*Turner*—Cory).—Double scarlet, show form, 2 feet.

Zwergsonne (Dobbie & Carter Page).—Canary-yellow, cactus-shaped flowers, 1½ feet.

Pompon Varieties.

Ace of Diamonds (*Keynes*).—Bright scarlet-crimson, 3 feet.

Annie Holton (*Cheal*).—Rich crimson, tipped silver, 3 feet.

Bacchus (*Keynes*—Cory).—Crimson-scarlet, 3 feet.

Beauty (*Dickson & Robinson*).—Terra-cotta, shading to orange at base, 2½ feet.

Blush Gem (*Walker*—Cory).—Mauve-pink, light centre, 3 feet.

Bonella (*Dobbie*—Cory).—Deep rosy pink, shaded rose, 2½ feet.

Crimson Beauty (Cory).—Bright crimson, 3 feet.

Crusoe (*Cheal*).—Blush, edged rose-pink, 4 feet.

Daisy (*West*—Dobbie).—Amber, shaded salmon, 3 feet.

Darkest of All (*West*—Cory).—Blackish maroon, 3 feet.

Dewdrop (*West*—Cory).—White with lavender edges, 3 feet.

Douglas (*Turner*).—Deep maroon, shaded crimson, 3 feet.

Emily Hopper (*Ware*—Dobbie).—Clear yellow, 3 feet.

Evelyn (*Mortimer*—Cory).—Bright crimson, 1½ feet.

Firebrand (*Dickson & Robinson*).—Bright flame-colour, 2 feet.

Glow (*Cheal*—Dobbie).—Rich coral, 3 feet.

Ideal (*West*—Cory).—Pure yellow, 3 feet.

Irene (*Cheal*).—Pale rosy mauve, 3 feet.

Mars (*Turner*).—Bright scarlet, 3 feet.

Neatness (*West*—Cory).—Pale amber, 3 feet.

Queen of Hearts (*Keynes*—Dobbie).—Pure white, 3 feet.

Rodney (*Turner*—Dobbie).—Fawn, shaded yellow, 3 feet.

Tommy Keith (*West*—Cory).—Red, tipped white, 2½ feet.

Tommy Laing (*Dobbie*).—Purple maroon, tipped white, 2½ feet.
Virginia (*Seale*—Turner).—Pure white, 3 feet.
White Aster (Dobbie).—Pure white, quilled florets, 3 feet.

Pæony-flowered Varieties.

Alecto (*Turner*).—Yellow, suffused crimson, 5 feet.
Balak (*West*).—Bright rosy crimson, 5 feet.
Burne Jones (*West*—Dobbie).—Fawn, suffused rose, 3½ feet.
Catherine (*Hobbies*).—Yellow, shaded brick red.
Codsall Gem (*Baker*—Dobbie).—Deep yellow, 4 feet.
Dormouse (*West*).—Velvety-crimson, 3 feet.
Elfrida (*Turner*—Hobbies) —Pink, shading white, 4 feet.
Frau Anna Galster (Dobbie).—Amber yellow, tinted red, 2½ feet.
Hall Caine (*Cannell*—Carter Page).—Yellow with chestnut shadings, 4 feet.
Hebe (*West*).—Pearly mauve, 2½ feet.
Hermosa (*Turner*).—Shading from medium to pale mauve, 5 feet.
H. J. Lovinck (*Warnaar*—Hobbies).—White, shaded mauve, 4 feet.
Holman Hunt (*West*—Cory).—Rich dark crimson, 5 feet.
John Green (*Stredwick*).—Yellow, edged bright red, 4 feet.
Kakadu (Dobbie).—Lemon-yellow, passing to white at tips, 2 feet.
Kevington (Cannell).—Salmon, shaded fawn.
Kimberley (*Dobbie*—Cory).—Rosy carmine, yellow centre.
King Leopold (*Warnaar*—Cory).—Pale yellow, 5 feet.
Ladysmith (*Dobbie*—Cory).—Violet-rose, 3½ feet.
Lemberg (*Turner*).—Red with yellow base.
Liberty (*West*—Baker).—Salmon-scarlet, 4 feet.
London (*Hobbies*).—Crimson-scarlet, 4 feet.
Lord Milner (*West*).—Yellow, edged white, 4 feet.
Mafeking (*Dobbie*—Cory).—Fawn, suffused rose, 3 feet.
May Day (*Hobbies*).—Yellow, shaded pink, 4 feet.
Miss Dora Wilson (*Cannell*).—Rosy vermilion shadings on yellow ground, 4 feet.
Miss Watson (*Cannell*—Cory).—Creamy white, striped and heavily marked rose, 3 feet.
Mrs. J. Chamberlain (*Baker*—Cory).—Salmon, yellow at base, 4 feet.
Mrs. Kerr (*Baker*—Cory).—Pale pink, suffused rose, 4 feet.
Mrs. T. G. Baker (*Baker*—Cory).—Pure white, 4 feet.
Nymphæ (*Turner*).—White with yellow base, 3 feet.
Pantaloon (*Cheal*).—Deep crimson, tipped white, 4 feet.
Paul Kruger (*Warnaar*—Cory).—Rose and white, 3 feet.
Phidias (*West*).—Lovely shade bright salmon-pink, 4 feet.
Porcupine (*Hobbies*).—White and rose, 4 feet.
Primrose Queen (*Turner*—Dobbie).—Clear yellow, 3½ feet.
Princess Ida (*Turner*).—White, yellow centre, 4½ feet.
Queen Mary (*Ware*).—Pure white.
Reynolds (*West*).—Deep crimson, 4 feet.
Rubens (*West*—Dobbie).—Rose pink, 4 feet.

Salome (*Turner*).—Bright orange, shaded buff, 3 feet.

Sheila (*Turner*).—Bright pink.

Sunset (*Baker*—Cory).—Vermilion, 4 feet.

Sunstar (*Turner*—Carter Page).—Rosy carmine, suffused yellow, 4 feet.

The Geisha (*Warnaar*—Cory).—Yellow, suffused red, 4 feet.

Titian (*West*).—Beautiful shade of rose-purple, 5 feet.

Turner (*West*—Treseder & Dobbie).—Lovely pink, very large, 4 feet.

Viscountess Newport (*Baker*—Cory).—Orange-red, shaded buff, 4 feet.

Warrior (*Baker*—Cory).—Deep red, 4 feet.

Mignon Varieties.

Agnes (*Cheal*).—Purple, distinct, 18 inches.

Daphne (*Cheal*).—Maroon, good habit, 18 inches.

Lancer (*Cheal*).—Scarlet, bushy habit, 18 inches.

Olive (*Cheal*).—Orange, very free, 18 inches.

Parisian Singles.

Notre Dame (*Millet Frères*—Riding).—White, broad picotee banding of amber, 2 feet.

Paris (*Millet Frèrès*—Riding).—White, broad picotee banding of scarlet, 2 feet.

Collarette Varieties.

Cantick (*Dobbie*).—Pale yellow ground and tips, heavily marked rosy red, collar pale yellow, 4 feet.

Countess I. Hardegg (*Goos & Koenemann*—Dobbie).—Purple passing to rose, white collar, 3 feet.

Countess Dugon (*Rivoire*—Riding).—White ground, splashed rosy purple, white collar, 3 feet.

Cumbrae (*Dobbie*).—Deep rose-pink, shaded purple, white collar, 3 feet.

Diadem (*Goos & Koenemann*—Dobbie).—Rose, with white collar, 3 feet.

Exposition de Lyon (*Rivoire*—Riding).—Beautiful rosy red, 3 feet.

Frogmore (*Dobbie*).—Vermilion with yellow collar, 3 feet.

Gunfleet (*Dobbie*).—Ruby, golden tips, 3 feet.

Henri Farman (*Rivoire*—Dobbie & Dickson).—Bright vermilion, edged primrose, 3½ feet.

Holyrood (*Dobbie*—Cory).—Ruby red, golden tips, 3½ feet.

Lynas (*Dobbie*).—Orange-salmon, collarette pale yellow.

Madame J. Buyssens (*Nagels*—Dobbie).—Dark crimson, edged rosy carmine, 3 feet.

Maurice Rivoire (*Rivoire*—Cory).—Rosy carmine, white collar.

Negro (*Cannell*—Dobbie).—Dark maroon, collar white, 3½ feet.

Prince de Venosa (*Rivoire*—Dobbie).—Crimson, shaded violet, white collar, 3½ feet.

Prince of Orange (*Dobbie*).—Beautiful orange self, collar tipped yellow, 3 feet.

Princess Louise (*Dobbie*).—Rich crimson, white collar.

Queen Bess (*Dobbie*).—Orange-scarlet, yellow collar, 4 feet.

Regularity (*Stredwick*).—Purple, with white collar.

St. Abb's (*Dobbie*).—Crimson, petals tipped yellow, straw collar, 3 feet.

Sunburgh (*Dobbie*).—Purplish mauve, heavily suffused white, 3 feet.

Tarbat Ness (*Dobbie*).—Deep wine-crimson, tipped white, collar pale yellow, 4 feet.

Tuscar (*Dobbie*).—Wine-crimson petals, tipped white, collar white, 3 feet.

Decorative Varieties.

Brentwood Yellow (*West*).—Golden yellow, 2 feet.

Charming (*Keynes*).—Clear pink, flowers of medium size, 4 feet.

Ch. Ducrot (Riding).—Vivid scarlet, long pointed petals, erect stems, 3 feet.

Délice (*Charmet*—Dickson & Robinson).—Bright rose-pink, 4 feet.

Harmony (*Keynes*).—Silvery pink, satiny, 3 feet.

Hon. R. Borden (*Cannell*).—Golden yellow, shading old gold, 4 feet.

Jeanne Charmet (*Charmet*—Cory).—Lilac-pink, shading white, 3 feet.

Kaiserin A. Victoria (Carter Page).—Pure white, 3 feet.

Le Grand Manitou (*Rivoire*—Carter Page).—Lilac-rose, spotted bright purple, 3 feet.

Loveliness (*Turner*—Cory).—Lovely shade of rose-pink, 3 feet.

Madame M. Collet (*Cayeux & Le Clerc*).—Deep salmon, shading to yellow centre, large, 4 feet.

Mammoth (*Cayeux & Le Clerc*).—Intense crimson scarlet, flowers large, 5 feet.

Mont Rose (*Charmet*—Riding).—Deep rose, 3 feet.

Sea-shell (*Seale*—Cory).—Shell pink and amber, small-flowered variety.

Sou. de G. Doazon (Cory).—Bright scarlet, immense flowers, 5 feet, 3 feet.

Show and Fancy Varieties.

David Johnson (*Humphries*—Dickson).—Salmon, shaded rose, 3 feet.

Duchess (*Dobbie*).—Orange-scarlet, 3 feet.

Edward Mawley (*Turner*).—Crimson, very erect, 3 feet.

J. Bennett (*Rawlings*—Turner).—Yellow, tipped red, 3 feet.

Mariner (*Harris*—Cory).—Lilac ground, splashed purple, 3 feet.

Merlin (*Turner*).—Orange-scarlet, 3 feet.

Mrs. Ormrod (*Dobbie*).—Rosy peach, 3 feet.

Peacock (*Turner*—Treseder).—Maroon, tipped white, 4 feet.

Queen of the Belgians (*Rawlings*—Turner).—Cream, tinted pink, 4 feet.

Sunbeam (*Turner*—Treseder).—Clear buff, 2½ feet.

MISCELLANEOUS FLOWERING PLANTS AT WISLEY, 1913.

AGERATUM.

Mauve Beauty (R. Veitch).—A very pretty dwarf and compact bedding variety, producing bluish-mauve flowers in great profusion.

ALYSSUM.

compactum 'Little Dorrit' (R. Veitch).—A very useful white annual, of dwarf and compact habit, suitable for carpeting; very free-flowering.

ARTEMISIA.

viridis (Barr).—A compact-growing plant with pretty light-green fern-like foliage, possessing a strong pungent odour.

ASTER (*Callistephus*).

Alice Roosevelt (Dammann).—Flowers large, double, deep rose, 4 inches across; height 18 inches, well branched and free-flowering. Twenty-five per cent. of the stock not true.

Elegance, Carmine Rose (R. Veitch).—A mixed stock producing carmine rose, white, and violet single flowers with quilled florets and golden centres. Height 2 feet.

Elegance, Delicate Rose (R. Veitch).—A pretty rose-coloured variety, similar in character to the preceding.

Elegance, Light Blue (R. Veitch).—A mixed stock giving white, violet-purple, deep rose, and white flowers, both single and double, and with plain and quilled florets.

Elegance, White (R. Veitch).—A good white variety, measuring $3\frac{1}{2}$ inches across. A pure stock.

Elena (Dammann).—A very pretty variety, bearing pale pink double flowers, 4 inches in diameter. The plants measure 18 inches all, are well branched, and flower freely. A pure stock.

Frau Marta Dammann (Dammann).—A good double white variety, $4\frac{1}{2}$ inches across; height 1 foot; plants free-flowering and well branched.

Pale Yellow (R. Veitch).—Flowers, semi-double, pale sulphury yellow, $3\frac{1}{2}$ inches across. Height 2 feet, well branched from the base, and a true stock.

Sada Yakko (Dammann).—A very pretty variety, having pale lilac double flowers.

Sada Yakko grandiflora (Dammann).—Similar to Elena, but with larger and longer petals. A pure stock.

Venus (Dammann).—A well-branched, free-flowering variety, with double white flowers. A true stock.

CALCEOLARIA.

The Bronze Age (R. Veitch).—A most useful greenhouse variety, of dwarf habit, bearing flowers of various shades of buff, brown, and crimson.

× *Veitchii* (R. Veitch), **A.M.** May 22, 1912.—A remarkable greenhouse perennial, obtained as the result of a cross between *Calceolaria alba* and an unnamed albino seedling from C. 'Golden Glory.' It has a strong, bushy habit of growth, and shiny serrated leaves. The flowers, which are borne in great abundance, are milk-white in colour. The plants grow to the height of 3 feet during the first season.

CINERARIA.

maritima 'Diamant' (R. Veitch).—A useful plant, with beautiful grey foliage. The leaves are roughly ovate in shape, deeply and irregularly notched, tough, covered with a thick whitish tomentum, to which the grey colour is due.

CLARKIA.

elegans 'Chamois Queen' (Barr).—A pretty variety bearing double white flowers suffused with pale rose-pink.

elegans 'Firefly' (R. Veitch).—See vol. xxxviii. p. 556.

elegans 'Orange King' (R. Veitch).—Flowers double, orange tinged with pink; very free-flowering.

elegans 'Queen Mary' (R. Veitch).—A pretty rosy salmon double-flowered variety.

Pink Pearl (Barr).—Flowers double, white tinged with pale salmon pink at the base of the petals.

Queen Mary (Barr).—Similar to those of *elegans* 'Queen Mary.'

Scarlet Queen (Barr, R. Veitch).—See vol. xxxviii. p. 556.

DAHLIA.

Edith Carter (Shoesmith), **A.M.** Aug. 27, 1912.—A seedling 'Cactus' variety, of good form and moderate size. The florets are deep yellow, tipped and streaked with crimson.

Florrie Wells (Shoesmith).—A bright crimson 'Cactus' variety, of excellent form.

odorata grandiflora (Dammann).—Flowers single, of excellent form, mostly orange-scarlet in colour, with small golden centre. Stems very stiff; plants vigorous in habit.

Vesuvius (Dammann).—A single variety, deep scarlet in colour, with small golden centre. Diameter of flower 5 inches; very showy; stems stiff and wiry.

DELPHINIUM.

Azure Fairy (Barr).—A very pretty strain, producing light and dark blue flowers. The foliage is finely divided, and the plants are dwarf and free-flowering in habit.

Belladonna, Cliveden Beauty (Barr).—A very pretty dwarf variety, bearing an abundance of deep cornflower-blue flowers.

Blue Butterfly (Barr).—See vol. xxxvi. p. 704.

grandiflorum selected (Barr).—Habit and colour like 'Blue Butterfly.'

Tom Thumb Ultramarine (Barr).—A very pretty dwarf variety, only a few inches high, bearing deep cornflower-blue flowers tipped with violet.

White Butterfly (J. Veitch).—Similar to Blue Butterfly in habit, but white in colour.

DIANTHUS.

Lucifer (Barr).—Flowers double, rich carmine-red, reverse old rose, petals serrated.

DIMORPHOTHECA.

aurantiaca (Barr), **A.M.** May 26, 1908.—See vol. xxxvi. p. 704.

sinuata (Barr, R. Veitch).—Very free-flowering; flowers buff, tinged with salmon.

GILIA.

dichotoma (J. Veitch).—A pretty dwarf plant with small linear leaves and pure white flowers, 1 inch across. Height 6 inches.

GLADIOLUS.

Peace (Cowee).—A charming variety, bearing large white flowers, faintly tinted with pale lilac-rose, and having the middle lower petal marked at the base with rosy magenta. The flowers measure 4 inches across. Height 3 feet 6 inches; length of spike 18 inches.

HELIOTROPE.

Lemoine's Giant Blue (R. Veitch).—A very vigorous variety, growing 2 feet high, and bearing good trusses of large flowers of varying shades of violet and deliciously scented.

Lemoine's Giant White (R. Veitch).—Flowers whitish, sweetly scented. Similar in habit to the preceding.

Mrs. Hudson (Hudson).—An excellent variety, of good, sturdy habit, bearing large racemes of violet-purple (shade 2, Répertoire de Couleurs) flowers, which have a delicious fragrance. This variety is the darkest in colour yet introduced.

IMPATIENS.

Roylei 'White Queen' (Barr).—A medium-sized pure white variety, which made excellent growth. Height about 2 feet; leaves lanceolate, glabrous, serrated; plant free-flowering in habit.

LINARIA.

dalmatica (Barr).—Plants spreading in habit, many of the shoots measuring 3 feet in length. Flowers deep yellow, having the lower lip tipped with orange. Leaves ovate, sessile, glaucous, entire.

dalmatica speciosa (Barr).—Similar to the preceding.

maroccana 'Excelsior' (J. Veitch).—See vol. xxxviii. p. 558.

LOBELIA.

Erinus compacta 'Belle de Moray' (Barr).—A very pretty dark blue variety, of compact habit.

Perle d'Azur (Barr).—A very free-flowering azure-blue variety, of compact habit.

Sapphire (Barr).—A pretty prostrate variety, of free-flowering habit. The blooms are deep marine-blue in colour, blotched with white on the lower petals.

tenuior (Barr).—Flowers large, violet-blue, with a white spot at the base of the lower petal. Growth rather straggling; leaves long and lanceolate.

MYOSOTIS.

Ruth Fischer (Barr).—A charming variety, of dwarf, compact habit, with large sky-blue flowers, tinged with pink in the bud state. It is very free-flowering, and is undoubtedly one of the best 'Forget me-nots' yet introduced.

NEMESIA.

New Dwarf Hybrids (Barr).—A mixed strain, growing not more than 1 foot high. The colours include red, orange, yellow, white, and violet.

strumosa Suttonii (Barr).—Flowers large, rich orange, with a black blotch at the base of the throat. Height 18 inches; wonderfully free-flowering. Some of the plants bore crimson flowers.

NICOTIANA.

plumbaginifolia hybrida (Dammann, R. Veitch).—A strong-growing variety, reaching 4 feet in height. The leaves are large and broad, and the small flowers, which are borne abundantly, vary in colour from sulphury-white through shades of old rose to dull crimson.

PENTSTEMON.

Forbes' Hybrids (Forbes).—Sent in 1912. An excellent, large-flowered strain, comprising varying shades of rose and amaranth red.

Hartwegii albus (R. Veitch).—A good pale sulphury-white variety, coming true from seed.

PETUNIA.

Dwarf large-flowering fringed (R. Veitch).—Flowers large, mostly deep purple. Plants about 1 foot high, very free-flowering.

Lord Courtenay (R. Veitch).—A very pretty variety, of trailing habit, bearing rosy carmine flowers in abundance. Leaves ovate and tough.

PHLOX.

Drummondii hortensiaeflora Salmon Beauty (Barr).—A very pretty pale salmon-pink form of this popular annual.

Drummondii 'Improved Dwarf' (Barr).—A very pretty strain, about 6 inches high, and including the following colours: cerise, crimson, creamy-white, purple, and rose.

Giant-flowered Dwarf (Barr).—A fine form of *P. Drummondii*, with large flowers of white, crimson, and magenta.

Surprise (Barr).—Flowers rosy salmon-pink, with amber-white centre and a deep reddish blotch at the base of each petal. Very pretty, and about 6 inches high.

Rose.

Heinrich Munch (Butz).—A charming rose, of vigorous growth. The flowers are large, sweetly scented, very full, and the colour is a pale Rose Neyron red (shade 1, Répertoire de Couleurs).

Salpiglossis.

Large-flowered (Barr).—A tall strain, bearing large flowers of yellow, crimson, and blue shades.

New Dwarf Compact (Barr).—A very sturdy strain, growing about 18 inches high, and producing crimson, scarlet, blue, and yellow flowers in abundance.

variabilis nana superbissima (R. Veitch).—A useful variety, of medium size, growing 18 inches high. The colours include shades of rose and yellow.

Salvia.

azurea alba grandiflora (Dammann).—A very handsome herbaceous plant, bearing spikes of small, pale lavender-blue flowers, the lower lip of which has a patch of white upon it. Plants very free-flowering.

patens (Barr).—Flowers deep blue, produced abundantly. Height 2 feet; leaves opposite, tough and hairy.

patens 'New Early Dwarf' (Barr).—See vol. xxxvi. p. 707.

splendens 'Fireball' (Barr).—See vol. xxxvi. p. 707.

splendens 'Victor Emmanuel' (Barr).—Plants very bushy and covered with deep scarlet flowers. An invaluable plant for bedding.

Schizanthus.

grandiflorus Hybrids (R. Veitch).—A very pretty strain, varying in colour from white to purple.

wisetonensis 'Excelsior' (R. Veitch).—A good strain. The flowers are mostly of rose-pink and purple shades.

Sunflower.

Red (Wilks).—A very free-flowering annual. The flowers measure 6 inches across, and are deep chrome-yellow in colour, marked with light chestnut-red. Plants 5–6 feet high, freely branched, and bearing ovate, serrate, hairy leaves. Stock not fixed.

Sweet Pea.

Afterglow.—See vol. xxxviii. p. 271.

Agricola.—A pretty violet-rose variety, of vigorous habit.

America Spencer.—See vol. xxxvii. p. 394.

Arthur Green.—See vol. xxxvii. p. 394.

Asta Ohn.—See vol. xxxvii. p. 394.

Audrey Crier, **A.M.** July 31, 1906.—A lovely variety, of a bright shade of crimson-pink, slightly suffused with salmon in the standard Free-flowering and strong in growth.

Bertha Massey.—The flowers of this charming variety are a pale shade of pure mauve, slightly flushed with salmon at the edges of the standard. Very free-flowering.

Black Knight.—See vol. xxxvii. p. 394.

Bolton's Pink.—See vol. xxxvii. p. 394.

Brunette.—Failed.

Charles Foster.—See vol. xxxviii. p. 271.

Clara Curtis.—See vol. xxxvii. p. 394.

Constance Oliver.—See vol. xxxvii. p. 394.

Countess Spencer.—See vol. xxxvii. p. 394.

Dainty Spencer.—See vol. xxxvii. p. 394.

Dobbie's Cream.—See vol. xxxviii. p. 271.

Dobbie's Mid-Blue, **A.M.** June 23, 1908.—See vol. xxxvii. p. 394.

Dobbie's Scarlet.—A very effective variety, with large bright scarlet flowers borne in abundant four-bloomed sprays.

Dobbie's Sunproof Crimson, **A.M.** June 21, 1910.—See vol. xxxvi . p. 394.

Dobbie's Thomas Stevenson, **A.M.** June 4, 1912.—See vol. xxxviii. p. 274.

Dobbie's True Lavender, **A.M.** July 29, 1913.—A beautiful variety, with pale lavender-blue flowers of good size.

Doris Usher, **A.M.** July 6, 1909.—Flowers large, deep rose-pink, shaded with salmon in the upper part of the standard. A very charming variety.

Dorothy.—Standard pale mauve shaded with salmon; wings purplish-mauve.

Dorothy Eckford, **A.M.** September 2, 1902.—See vol. xxxviii. p. 271.

Duplex.—See vol. xxxviii. p. 272.

Earl Spencer, **A.M.** July 19, 1910.—See vol. xxxviii. p. 271.

Edith Taylor, **A.M.** June 17, 1913.—A very beautiful variety. The colour is a very bright and attractive shade of rosy cerise. The flowers are large and borne abundantly in threes and fours.

Edrom Beauty.—See vol. xxxviii. p. 272.

Elfrida Pearson, **A.M.** July 19, 1910.—See vol. xxxviii. p. 272.

Elsie Herbert, **A.M.** July 9, 1907.—Failed.

Etta Dyke.—See vol. xxxvii. p. 395.

Evelyn Hemus, **A.M.** June 25, 1907.—See vol. xxxvii. p. 395.

Flora Norton Spencer.—See vol. xxxvii. p. 395.

Helen Grosvenor.—Failed.

Helen Pierce, **A.M.** July 14, 1911.—See vol. xxxvii. p. 395.

Hercules, **A.M.** July 26, 1912.—See vol. xxxviii. p. 272.

Improved Bertrand Deal.—Flowers pure mauve, shaded with rose in the standard.

Inspector.—A beautiful bright orange-salmon variety, with double standards. It is what is known as the duplex form of Earl Spencer.

Isobel Malcolm, **A.M.** July 26, 1912.—See vol. xxxviii. p. 272.

Ivanhoe, **A.M.** June 21, 1910.—See vol. xxxvii. p. 395.

James Grieve.—See vol. xxxvii. p. 395.

John Ingman.—See vol. xxxvii. p. 396.

King Edward VII.—See vol. xxxvii. p. 396.

Lady G. Hamilton, **A.M.** July 14, 1896.—See vol. xxxvii. p. 396.

Lady Knox, **A.M.** July 14, 1911.—Failed.

Lady Miller.—Colour very pale apricot, suffused with rose. Growth weak.

Lavender George Herbert, **A.M.** June 4, 1912.—Flowers lavender, heavily suffused with rosy mauve. Borne mostly in fours.

Lord Nelson.—See vol. xxxvii. p. 396.

Loyalty.—See vol. xxxviii. p. 272.

Marchioness of Tweeddale.—See vol. xxxviii. p. 272.

Margaret Madison.—Flowers large, pale Parma violet, mottled with lavender and shaded with pale lilac. Standard prettily crinkled.

Marie Corelli.—See vol. xxxvii. p. 396.

Marion Cuthbertson, **A.M.** July 19, 1910.—See vol. xxxviii. p. 273.

Mark's Tey.—Flowers large, standard rosy maroon, wings bright rosy mauve.

Masterpiece, **A.M.** July 6, 1909.—See vol. xxxvii. p. 396.

Mauve Queen.—See vol. xxxviii. p. 273.

May Campbell, **A.M.** June 4, 1912.—See vol. xxxviii. p. 273.

Melba, **A.M.** May 22, 1912.—See vol. xxxviii. p. 273.

Miriam Beaver.—Flowers large, shaded with bright salmon-pink on a pale yellow ground. Stock not quite true.

Mrs. A. Ireland.—See vol. xxxvii. p. 396.

Mrs. Cuthbertson, **A.M.** May 22, 1912.—See vol. xxxviii. p. 273.

Mrs. C. W. Breadmore.—See vol. xxxvii. p. 396.

Mrs. George Charles.—See vol. xxxvii. p. 397.

Mrs. Hardcastle Sykes.—See vol. xxxvii. p. 396.

Mrs. Heslington.—See vol. xxxviii. p. 273.

Mrs. Hugh Dickson, **A.M.** July 6, 1909.—See vol. xxxviii. p. 273.

Mrs. J. C. House.—A lovely bright rosy mauve variety, having the standards slightly suffused with salmon.

Mrs. Routzahn, **A.M.** July 26, 1912.—See vol. xxxviii. p. 273.

Mrs. W. J. Unwin.—See vol. xxxviii. p. 273.

Nettie Jenkins.—Flowers large, pale lavender-blue, heavily shaded with purplish-mauve, especially in the upper part of the standard. A very pretty variety, strong in growth.

Nora Unwin.—See vol. xxxvii. p. 397.

Nubian, **A.M.** July 14, 1911.—See vol. xxxvii. p. 397.

Othello Spencer.—See vol. xxxvii. p. 397.

Prince George.—A very striking variety, having the wings pure mauve and the standard the same tinted with salmon.

Princess Victoria, **A.M.** July 9, 1907.—See vol. xxxvii. p. 397.

Queen Alexandra.—See vol. xxxvii. p. 397.

Queen of Norway.—A magnificent purplish-mauve variety, bearing large flowers.

Queen of Spain Spencer, **A.M.** July 14, 1911.—See vol. xxxvii. p. 397.

Red Star.—See vol. xxxviii. p. 274.

Rosabelle.—See vol. xxxviii. p. 274.

Rose du Barri.—See vol. xxxvii. p. 397.

Senator Spencer.—See vol. xxxvii. p. 397.

Stirling Stent, **A.M.** June 22, 1909.—See vol. xxxviii. p. 274.

Sybil Eckford.—A pretty variety, having a cream ground flushed with rosy pink.

Syeira Lee.—Flowers large, ground cream, heavily suffused with bright rose-pink.

Tennant Spencer, **A.M.** July 26, 1912.—See vol. xxxviii. p. 274.

The Marquis.—See vol. xxxvii. p. 397.

Tom Bolton.—See vol. xxxvii. p. 397.

W. P. Wright.—A most distinct variety, with large flowers of a lovely pale lavender-blue shade.

TROPAEOLUM.

Feltham Beauty (J. Veitch).—See vol. xxxvii. p. 560.

Queen of Tom Thumbs (R. Veitch).—See vol. xxxvi. p. 706.

VERBASCUM.

Harkness's Hybrid (Barr).—A bold herbaceous plant, very suitable for the border. It grows 7 feet high and carries numerous large spikes of deep primrose-yellow flowers, each measuring about 1½ inch across.

VERBENA.

grandiflora 'Ellen Willmott' (R. Veitch).—A lovely carmine-red variety with pale sulphur-yellow eye.

New Giant-flowered (Barr).—A large-flowered strain, producing flowers in shades of crimson and violet-purple.

Very Choice Mixed (Barr).—A good strain, producing a wide range of colours.

VIOLA.

cornuta 'Admiration' (Heinemann).—A very fine crimson-purple, rayed variety, of vigorous and free-flowering habit.

cornuta 'Alpha' (Heinemann).—Flowers very deep purple, rayed, much fuller than those of the preceding.

cornuta 'Rosy Lilac' (Heinemann).—Flowers whitish, prettily tinted with rosy lilac and lightly rayed.

cornuta 'Thuringia' (Heinemann).—Flowers deep violet-purple, large, rayed; centre amber-white, upper petals crimson-purple.

cornuta 'True Blue' (Heinemann).—Flowers of good form, deep violet-purple with slightly darker centre, rayed.

lutea splendens (Heinemann).—A very pretty deep golden-yellow variety, with dark brown rays.

VISCARIA.

coerulea (Barr).—Flowers blue, tinged with mauve, very pretty.

oculata azurea (R. Veitch).—The flowers are larger than those of the preceding, and are of a bluish-mauve tint. The plant is a strong grower and inclined to be rather straggling in habit.

ZINNIA.

Double Giant crimson (Barr).—Flowers large, crimson.

Double Giant Flesh-coloured (Barr).—A very large, pale rose-pink variety.

Double Giant Golden Yellow (Barr).—Flowers bright orange.

Double Giant Purple (Barr).—The flowers of this variety are of a rich deep crimson shade.

Double Giant Scarlet (Barr).—This is a very effective variety, of a rich fiery orange colour.

Double Giant Sulphur Yellow (Barr).—The flowers of this are very deep yellow in colour.

Double Giant Violet (Barr).—The flowers of this stock varied in colour from crimson to orange-scarlet.

Double Giant White (Barr).—A large creamy-white variety.

Large-flowered Double Mixed (Barr).—A good strain, giving large flowers varying in colour from rose-pink to deep crimson, and including some shades of orange and yellow.

CULINARY PEAS TRIED AT WISLEY, 1913.

TWO HUNDRED AND SEVENTEEN stocks of Peas were received for trial in 1913. They were all sown on three dates, viz. March 20, April 30, and May 29. The first and second sowings germinated well, with one or two exceptions, but in the third sowing, although out of the same packages, many failed to germinate at all, others germinated badly, and some germinated well. Probably the very dry weather at the time of the third sowing was the cause of the bad germination. The plants of the first and second sowings were quite successful, being vigorous, free from insect or fungus pests, and producing very heavy crops. The Fruit and Vegetable Committee examined the collection on three occasions, and expressed their admiration of the first and second sowings.

VARIETIES.

*1. Abundance.
2. Acme.
3. Alderman.
4. Alderman (selected).
5. America.
6. American Wonder.
7. Autocrat.
8. Autocrat.
9. Battleship.
10. Benefactor.
11. Benefactor.
12. Best of All.
13. Best of All.
14. Boston Unrivalled.
15. Bountiful.
16. British Lion.
17. British Queen.
18. Buttercup.
19. Captain Cuttle.
20. Centenary.
21. Champion of England.
22. Chelsea Gem.
23. Commonwealth.
24. Daffodil.
25. Daisy.
26. Daisy.
27. Danby Stratagem.
28. Dawn.
29. Daylight.
30. Delicatesse.
31. Discovery.
32. Discovery.
33. Dreadnought.
34. Dwarf Defiance.
35. Dwarf Favourite.
36. Dwarf Monarch.
37. Duchess of York.
38. Duke of Albany.
39. Duke of Sutherland.
40. Earliest Blue.
41. Earliest Wrinkled Marrow
42. Early Duke.
43. Early Dwarf.
44. Early Morn.
45. Early Round.
46. Early Sunrise.
47. Eclipse.
48. Eight Weeks.
49. Eldorado.
50. Empress of India.
51. English Wonder.
52. English Wonder.

* See footnote, p. 636.

53. Eureka.
54. Evergood.
55. Evergreen Delicatesse.
56. Excelsior.
57.–59. Exhibition.
60. Exonian.
61. Explorer.
62. Favourite.
63. Fillbasket.
64. First of All.
65. Forcing Pea.
66. Forward.
67. Giant Blue Express.
68.–69. Giant Lightning.
70.–73. Gladstone (selected).
74. Glory.
75. Glory of Devon.
76. Golden King.
77. Goldfinder.
78.–79. Gradus.
80. Green Daisy.
81. Green Gem.
82. Harbinger.
83. Harvestman.
84. Hundredfold.
85. Ideal.
86. Ideal (Dwarf).
87. Incomparable.
88. International.
89. Invincible Marrowfat.
90. James Holmes.
91. King Alfred.
92. King of the Dwarfs.
93. Lancastrian.
94. Langley Gem.
95. Late Queen.
96. Latest Giant.
97. Laxtonian.
98. Laxtonian (re-selected).
99.–102. Little Marvel.
103. Longstander.
104. Lord Rosebery.
105. Magnum Bonum.
106. Maincrop.
107. Majestic.
108. Marchioness.
109. Market Favourite.
110. Market Gardener.
111. Market Surprise.
112. Marquis of Stafford.
113.–114. Marvellous.
115.–116. Masterpiece.
117. Matchless.
118. Mayflower.
119. May Queen.
120. Meteor.
121. Michaelmas.
122. Monster-podded Sugar Pea.
123. Ne Plus Ultra.
124. Omega.
125. Omega (improved).
126. Passport.
127. Peerless.
128. Perfection (re-selected).
129. Perfection.
130. Perpetual.
131. Peter Pan.
132. Pilot (re-selected).
133. Pioneer.
134. Premier.
135. Primo.
136. Prince of Peas.
137. Prince of Wales.
138.–139. Prizewinner.
140. Prodigy.
141.–142. Quite Content.
143. Reading Wonder.
144.–145. Rearguard.
146. Ringleader (improved).
147. Royal Salute.
148. Sangster's No. 1.
149. Satisfaction.
150. Saxa.
151. Seedling.

152. Sir Arthur Bignold.
153. Snowdrop.
154. Springtide.
155. St. Désirat.
156. St. Duthus.
157. Standwell.
158. Stratagem (selected
159. Stratagem (selected
160. Stratagem (selected
161. Stratagem (re-selected).
162. Sugar Pea (dwarf Brittany).
163. Superb.
164. Superlative.
165. Talisman.
166. Telephone.
167. Telephone.
168. The Argyle.
169. The Bell.
170. The Comet.
171. The Clipper.
172. The Peer.
173. The Pilot (re-selected).
174. The Pilot (re-selected).
175. The Pilot (re-selected).
176. The Scout.
177. The Sherwood.
178. Thos. Laxton.
179. Up-to-Date.
180. Vanguard.
181. Vanguard.
182. Veitch's Perfection.
183. Veitch's Perfection.
184. Victor.
185. Warriston Wonder.
186. Western Express.
187. William I. (improved).
188. William Hurst.
189. Wintonian.
190. World's Record.
191. Wrinkled Marrow.
192. Yorkshire Hero.
193. No. 336.
194. No. 763.
195. No. 825.
196. No. 1044.
197. No. 3879.
198. No. 3880.
199. No. 3948.
200. No. 3949.
201. No. 3951.
202. No. 3952.
203. No. 3953.
204. No. 3959.
205. No. 3960.
206. No. 14019.
207. No. 14035.
208. The Langport.
209. Glory of Somerset.
210. James Kelway.
211. John Downie.
212. Orwell.
213. Prime Minister.
214. Sir Henry.
215. Sir Herbert.
216. Dwarf Mammoth.
217. The London.

F.C. = First-class Certificate.
A.M. = Award of Merit.
XXX = Highly Commended.

1. Abundance (Sutton), **XXX** June 20, 1911.—Germination medium. Height 18 inches; haulm of medium strength and dark green; pods usually single, inflated, light green, 3½ inches long, straight with blunt end, five large peas in a pod; seeds wrinkled, green. Stock regular.

	Above ground.	In flower.*	Ready to pick.
First Sowing . .	April 7	May 30	June 23
Second ,, . .	May 15	June 16	July 27
Third ,, . .	June 9	July 10	Aug. 7

* The plants were considered to be in flower when six flowers had fully opened.

2. Acme (J. Veitch), **A.M.** July 5, 1898. Described vol. xxxvi. p. 711.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 30	June 19
Second ,, . .	May 15	June 16	July 3
Third ,, . .	June 9	July 7	Aug. 5

3. Alderman (A. Dickson), **F.C.C.** July 10, 1900.—Described vol. xxxvi. p. 718, but slightly dwarfer and of lighter colour.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 15	June 7	June 24
Second ,, . .	May 15	June 24	July 16
Third ,, . .	June 9	July 15	Aug. 13

4. Alderman (re-selected) (Dobbie), **F.C.C.** July 10, 1900.—Described vol. xxxvi. p. 718. Germination fair.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 9	July 5
Second ,, . .	May 15	June 24	July 18
Third ,, . .	June 10	Failed.	—

5. America (Holmes), **A.M.** July 18, 1911.—Described vol. xxxvii. p. 405; height variable, haulm weaker.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 7	June 26
Second ,, . .	May 15	June 24	July 18
Third ,, . .	Failed.	—	—

6. American Wonder (Sutton).—Described vol. xxxvi. p. 711.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second ,, . .	May 15	June 13	July 3
Third ,, . .	June 7	?	Aug. 5

7. Autocrat (Sutton), **F.C.C.** July 10, 1885.—Described vol. xxxvi. p. 724.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 18	July 12
Second ,, . .	May 15	July 3	Aug. 15
Third ,, . .	June 7	July 29	Aug. 29

8. Autocrat (J. Veitch), **F.C.C.** July 10, 1885.—Described vol. xxxvi. p. 724.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 18	July 21
Second ,, . .	May 15	July 3	Aug. 8
Third ,, . .	June 7	July 29	Aug. 18

9. Battleship (Carter), **XXX** July 7, 1913.—Described vol. xxxvi. p. 719. Haulm strong.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 4	July 3
Second ,, . .	May 15	June 23	July 19
Third ,, . .	June 7	July 16	Aug. 13

10. Benefactor (Hurst).—Height $3\frac{1}{2}$ feet; haulm light green, strong; pods in pairs, light green, $3\frac{1}{2}$ inches long, straight, ends curved, seven large peas in each; seeds round, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 19
Second ,, . .	May 15	June 13	July 4
Third ,, . .	June 7	July 4	Aug. 5

11. Benefactor (R. Veitch).—As No. 10.

12. Best of All (Sutton).—Described vol. xxxvi. p. 719.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 3
Second ,, . .	May 15	July 13	Aug. 5
Third ,, . .	Failed.	—	—

13. Best of All (Wheeler), **XXX** July 7, 1913.—Described vol. xxxvi. p. 719.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	June 6	June 26
Second ,, . .	May 15	June 23	July 18
Third ,, . .	June 10	Failed.	—

14. Boston Unrivalled (Barr), **A.M.** July 14, 1896.—Described vol. xxxiv. p. 289.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 6	June 26
Second ,, . .	May 15	June 23	July 18
Third ,, . .	June 9	Failed.	—

15. Bountiful (Sutton).—Described vol. xxxvi. p. 711. Stock greatly in need of selection. The size of the pods especially variable.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 30	June 20
Second ,, . .	May 15	June 16	July 3
Third ,, . .	June 7	July 7	Aug. 8

16. British Lion (A. Dickson).—Height 3½ feet; haulm rather weak, light green; pods borne in pairs, light green, 3 inches long, straight or slightly curved, six large peas in each; seeds round, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 29	June 19
Second ,, . .	May 15	June 16	July 4
Third ,, . .	June 9	July 7	Aug. 5

17. British Queen (Sutton).—Described vol. xxxvi. p. 719.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 18	July 7
Second ,, . .	May 15	July 3	?
Third ,, . .	June 10	Aug. 5	Failed.

18. Buttercup (Carter).—Height 18 inches; haulm strong, dark green; pods, borne mostly in pairs, dark green, 3¾ inches long, straight with curved end, seven fairly large peas in each; seeds round, blue; stock regular; crop good.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 6	July 3
Second ,, . .	May 15	June 23	July 16
Third ,, . .	June 6	July 18	Aug. 18

19. Captain Cuttle (Hurst), **A.M.** July 14, 1897.—Described vol. xxxvi. p. 724. Stock not quite pure.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 9	June 13	July 7
Second ,, . .	May 15	July 3	Aug. 5
Third ,, . .	Failed.	—	—

20. Centenary (Sutton), **A.M.** July 5, 1901.—Described vol. xxxvi. p. 716.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 6	July 3
Second ,, . .	May 15	June 23	July 16
Third ,, . .	June 9	July 29	Failed.

21. Champion of England (Sutton).—Height 6 feet; haulm fairly strong, light green; pods borne mostly in pairs, light green, 3 inches long, straight with blunt end, five medium-sized peas in each; seeds wrinkled and green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 4
Second ,, . .	May 15	July 3	Aug. 5
Third ,, . .	June 7	July 28	Aug. 25

22. Chelsea Gem (Sutton), **F.C.C.** July 1, 1887.—Described vol. xxxvi. p. 711.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 28	June 19
Second ,, . .	May 15	June 16	July 5
Third ,, . .	June 7	July 7	Aug. 5

23. Commonwealth (Carter).—Described vol. xxxiv. p. 289.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 13	July 3
Second ,, . .	?	July 3	Aug. 5
Third ,, . .	June 9	Failed.	—

24. Daffodil (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv. p. 288.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	May 31	July 5
Second ,, . .	May 15	June 18	July 10
Third ,, . .	June 9	Failed.	—

25. Daisy (Carter), **F.C.C.** July 11, 1902.—Described vol. xxvi. p. 277.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	June 7	July 3
Second ,, . .	May 15	June 23	July 18
Third ,, . .	June 7	July 18	Aug. 13

26. Daisy (Sutton), **F.C.** July 11, 1902.—Described vol. xxvi. p. 277.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 6	July 3
Second ,, . .	May 15	June 24	July 18
Third ,, . .	June 10	July 28	Failed.

27. Danby Stratagem (Carter), **A.M.** July 5, 1901.—Described vol. xxxiv. p. 290.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	June 6	July 3
Second ,, . .	May 15	June 26	July 18
Third ,, . .	June 9	July 28	Failed.

28. Dawn (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv. p. 288.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 4	June 26
Second ,, . .	May 15	June 23	July 16
Third ,, . .	June 7	July 16	Aug. 5

29. Daylight (Carter).—Described vol. xxxvi. p. 712. The pods are difficult to open.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 26	June 19
Second ,, . .	May 15	June 13	July 3
Third ,, . .	June 7	July 4	Aug. 8

30. Délicatesse (Carter).—Described vol. xxxvi. p. 719.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 9	July 3
Second ,, . .	May 15	June 26	July 21
Third ,, . .	June 10	July 22	Aug. 13

31. Discovery (A. Dickson), **XXX** July 7, 1913.—Described vol. xxxvi. p. 716.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 10	July 3
Second ,, . .	May 15	June 26	July 29
Third ,, . .	Failed.	—	—

32 Discovery (Sutton).—Described vol. xxxvi. p. 716.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 31	July 4
Second ,, . .	May 15	June 18	July 18
Third ,, . .	June 9	Failed.	—

33. Dreadnought (Carter).—Described vol. xxxvi. p. 724.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 13	July 5
Second ,, . .	May 15	July 3	Aug. 8
Third ,, . .	June 10	Failed.	—

34. Dwarf Defiance (Sutton), **A.M.** July 5, 1901.—Described vol. xxxvi. p. 716.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 3
Second ,, . .	May 15	June 26	July 23
Third ,, . .	June 7	July 21	Aug. 18

35. Dwarf Favourite (Carter).—Described vol. xxxvi. p. 712.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 3
Second ,, . .	May 15	June 26	July 23
Third ,, . .	June 7	July 21	Aug. 18

216. Dwarf Mammoth (Nutting).—Described vol. xxvi. p. 273. The stock requires selection.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 15	June 10	July 3
Second ,, . .	May 13	July 4	Aug. 5

36. Dwarf Monarch (Carter).—Described vol. xxxvi. p. 720. The pods are not well filled. Germination only fair.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 9	July 7
Second ,, . .	May 15	July 3	July 28
Third ,, . .	Failed.	—	—

37. Duchess of York (Sutton), **A.M.** June 20, 1901.—Described vol. xxxvi. p. 712.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 31	June 20
Second ,, . .	May 15	June 18	July 5
Third ,, . .	June 7	July 16	Failed.

38. Duke of Albany (Sutton), **A.M.** July 5, 1901.—Described vol. xxix. p. 681.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 6	July 3
Second ,, . .	May 13	July 3	Aug. 5
Third ,, . .	June 9	July 18	Aug. 28

39. Duke of Sutherland (Holmes).—Height 5½ feet; haulm light green, weak; pods borne in pairs, light green, 4½ inches long, curved, six large peas in each pod; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 6	July 4
Second ,, . .	May 15	June 23	July 16

40. Earliest Blue (Sutton).—Height 3½ feet; haulm wiry but strong; pods borne singly, light green, 3½ inches long, curved with blunt end, seven or eight large peas in each pod; seeds round, blue.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 27	June 19
Second ,, . .	May 15	June 13	July 4
Third ,, . .	June 7	July 4	July 31

41. Earliest Wrinkled Marrow (Holmes).—See description of Earliest Marrow vol. xxxvi. p. 712. It differs from that variety in having a light green, weak haulm.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 27	June 19
Second ,, . .	May 15	June 18	?
Third ,, . .	June 9	July 4	Aug. 8

42. Early Duke (Carter), **A.M.** July 5, 1910.—Described vol. xxxvii. p. 409.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 31	June 19
Second ,, . .	May 13	June 18	July 3
Third ,, . .	Failed.	—	—

43. Early Dwarf (Sutton).—Described vol. xxxvi. p. 712.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 28	June 19
Second ,, . .	May 13	June 13	July 3
Third ,, . .	June 7	July 7	Aug. 5

44. Early Morn (Carter), **A.M.** April 18, 1899 (as a forcing variety), **XXX** June 20, 1911.—Described vol. xxxiv. p. 288. The height is very variable. Stock requires selection for this character.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 27	June 19
Second ,, . .	May 12	June 13	?
Third ,, . .	June 7	July 4	Aug. 5

45. Early Round (Wheeler).—Height 3½ feet; haulm light green, weak; pods borne singly, dark green, 3½ inches long, curved, six large peas in each pod; seed round, white. Stock requires selection for height.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 26
Second ,, . .	May 15	June 11	July 10
Third ,, . .	June 7	July 4	Failed.

46. Early Sunrise (Sutton).—Described vol. xxxvi. p. 712.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 27	June 26
Second ,, . .	May 15	June 13	July 10
Third ,, . .	June 9	Failed.	—

47. Eclipse (Sutton).—Described vol. xxxiv. p. 288.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 19
Second ,, . .	May 13	June 11	July 3
Third ,, . .	June 7	July 4	July 30

48. Eight Weeks (Carter).—Described vol. xxxvi. p. 712.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 27	June 19
Second ,, . .	May 13	June 13	July 3
Third ,, . .	June 7	July 4	Aug. 5

49. Eldorado (Sharpe).—Height 12–18 inches; haulm weak, light green; pods borne singly, dark green, 3¼ inches long, curved, each containing five large peas; seeds round, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 27	June 23
Second ,, . .	May 14	June 13	July 4
Third ,, . .	June 7	July 7	Aug. 13

50. Empress of India (Sutton), **XXX** June 20, 1911.—Described vol. xxxvii. p. 409. Stock needs selection. Pods very irregular Crop poor.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 30	June 20
Second ,, . .	May 13	June 18	July 7
Third ,, . .	June 10	July 12	Aug. 8

51. English Wonder (Dobbie).—Described vol. xxxvi. p. 713.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 13	June 23
Second ,, . .	May 15	June 18	July 7
Third ,, . .	June 7	July 18	Aug. 8

52. English Wonder (Sutton). See No. 51.—This stock differs from the former in having shorter curved pods with only four peas in each. The crop was lighter.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 9	May 30	June 23
Second ,, . .	May 15	June 18	July 18
Third ,, . .	June 9	July 12	Aug. 8

53. Eureka (Sutton).—Described vol. xxxvi. p. 720.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 9	July 3
Second ,, . .	May 14	July 3	Aug. 5
Third ,, . .	June 9	July 23	Failed.

54. Evergood (A. Dickson).—Height 2½ feet. Haulm, moderately strong, dark green; pods borne mostly in pairs, dark green, 4¼ inches long, straight, blunt end, each containing five large peas; seed wrinkled, blue.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	June 9	July 5
Second ,, . .	May 13	July 3	July 29
Third ,, . .	Failed.	—	—

55. Evergreen Délicatesse (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv. p. 289.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 7	July 3
Second ,, . .	May 13	June 24	July 18
Third ,, . .	June 7	July 21	Aug. 13

56. Excelsior (Sutton), **A.M.** July 4, 1905.—Described vol. xxxvi. p. 713, No. 28.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 28	June 20
Second ,, . .	May 13	June 16	July 4
Third ,, . .	June 9	July 10	Aug. 5

57. Exhibition (Carter), **A.M.** July 16, 1910.—Described vol. xxxiv. p. 290. The stock is dwarfer (4½ feet high) than that described.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 6	July 3
Second ,, . .	May 15	June 23	July 18
Third ,, . .	June 9	July 18	Aug. 19

58. Exhibition (Sutton), **A.M.** Aug. 16, 1910. See No. 57.—Germination poor.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 3
Second ,, . .	May 14	July 3	Aug. 5
Third ,, . .	Failed.	—	—

59. Exhibition (Wheeler), **A.M.** Aug. 16, 1910. See No. 57.—Germination bad.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 10	June 9	July 3
Second ,, . .	May 15	June 26	July 23
Third ,, . .	Failed.	—	—

60. Exonian (R. Veitch), **F.C.C.** July 1, 1887. Described vol. xxxvii. p. 410.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 30	June 20
Second ,, . .	May 13	June 13	July 3
Third ,, . .	June 7	July 4	Aug. 8

61. Explorer (Sharpe).—Height 12–18 inches; haulm fairly strong, dark green; pods borne singly, dark green, 3 inches long, straight with curved end, six large peas in each; seed round, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 28	June 23
Second ,, . .	May 15	June 13	July 3
Third ,, . .	June 7	July 10	Aug. 13

62. Favourite (J. Veitch), **A.M.** July 15, 1913.—Height 3½ feet; haulm dark green, fairly strong; pods borne in pairs, dark green, 4½ inches long, straight with blunt end, each containing six medium-sized peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 11	July 3
Second ,, . .	May 15	July 4	July 23
Third ,, . .	June 7	July 23	Aug. 19

63. Fillbasket (Sutton), **F.C.C.** 1872.—Described vol. xxxvi. p. 717.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 6	June 23
Second ,, . .	May 15	June 23	July 10
Third ,, . .	June 7	July 18	Aug. 13

64. First of All (Sutton).—Described vol. xxxvi. p. 717.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 26	June 19
Second ,, . .	May 14	June 11	July 4
Third ,, . .	June 7	July 4	Aug. 5

65. Forcing Pea (Carter).—Height 15 inches; haulm dark green, strong; pods borne in pairs, dark green, 3½ inches long, straight with curved end, each containing six large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 6	July 3
Second ,, . .	May 13	June 18	July 16
Third ,, . .	June 9	July 12	Aug. 5

66. Forward (Holmes).—Height 4½ feet; haulm light green, weak; pods borne mostly in pairs, dark green, 3½ inches long, straight with curved end, each containing seven large peas; seeds wrinkled, blue.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 30	June 24
Second ,, . .	May 13	June 18	July 5
Third ,, . .	June 7	July 10	Aug. 5

67. Giant Blue Express (Carter).—Height 5 feet, haulm dark green, strong; pods mostly in pairs, dark green, 4 inches long, straight with blunt end, each containing eight medium-sized peas; seeds round, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 28	June 19
Second ,, . .	May 15	June 13	July 4
Third ,, . .	June 7	July 4	Aug. 8

68. Giant Lightning (Barr).—Described vol. xxxvi. p. 713.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 28	June 19
Second ,, . .	May 14	June 13	July 3
Third ,, . .	June 9	?	Aug. 5

69. Giant Lightning (Carter).—See No. 68.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 2	May 27	June 19
Second ,, . .	May 15	June 13	July 4
Third ,, . .	June 9	July 4	Aug. 5

70. Gladstone (Dobbie).—Described vol. xxxvii. p. 411, but read: pods borne mostly in pairs, curved.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 16	July 5
Second ,, . .	May 15	July 5	Aug. 5
Third ,, . .	June 11	Failed.	—

71. Gladstone (Hurst).—Described vol. xxxvii. p. 411. Height variable.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 18	July 4
Second ,, . .	May 13	July 10	Aug. 5
Third ,, . .	June 10	Failed.	—

72. Gladstone (selected) (Sutton).—Described vol. xxxvii. p. 411, but read: pods borne mostly in pairs, curved.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 16	July 5
Second ,, . .	May 13	July 5	Aug. 11
Third ,, . .	June 11	Failed.	—

73. Gladstone (R. Veitch).—Described vol. xxxvii. p. 411, but read: pods borne mostly in pairs, curved.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 16	July 4
Second ,, . .	May 13	July 3	Aug. 5
Third ,, . .	June 9	Failed.	—

74. Glory (Sutton).—Height 3½ feet; haulm dark green, strong; pods borne both in pairs and singly, dark green, 3 inches long, straight with blunt end, each containing medium sized peas; seeds round, blue. Height, variable.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 9	July 3
Second ,, . .	May 15	June 26	Aug. 5
Third ,, . .	June 9	July 21	Crop failed.

75. Glory of Devon (R. Veitch), **A.M.** July 11, 1899.—Described vol. xxxvi. p. 720.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 9	July 3
Second ,, . .	May 15	July 3	July 29
Third ,, . .	June 9	Failed.	—

209. Glory of Somerset (Kelway).—Height 3½ feet; haulm dark green, fairly strong; pods borne singly, dark green, 5 inches long, straight with curved end, each containing eight fairly large peas; seeds wrinkled, green. Crop poor.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 9	June 10	July 3
Second ,, . .	May 15	July 4	July 23

76. Golden King (Barr).—Described vol. xxxvi. p. 717.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 3
Second ,, . .	May 15	June 26	July 16
Third ,, . .	June 7	Failed.	—

77. Goldfinder (R. Veitch).—Described vol. xxxvi. p. 724, but read: height 6 feet.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 10	July 3
Second ,, . .	May 13	July 4	?
Third ,, . .	June 7	July 12	Aug. 19

78. Gradus (Dobbie), **F.C.C.** July 1, 1887.—Described vol. xxxvi. p. 713, but read: pods borne singly.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 28	June 20
Second ,, . .	May 13	June 13	July 4
Third ,, . .	June 9	July 10	Aug. 13

79. Gradus (Sharpe), **F.C.C.** July 1, 1887.—See No. 78.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second ,, . .	May 15	June 13	July 5
Third ,, . .	June 9	July 7	Aug. 13

80. Green Daisy (J. Veitch).—Height 2½ feet; haulm dark green, strong; pods borne singly, dark green, 4 inches long, straight with curved end, each containing six peas of moderate size; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 30	June 24
Second ,, . .	May 15	June 18	July 16
Third ,, . .	June 9	July 7	Aug. 13

81. Green Gem (Sutton), **A.M.** July 4, 1905. — Described vol. xxxvi. p. 713. The stock varies and needs selection.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 27	June 23
Second ,, . .	May 13	June 11	July 5
Third ,, . .	June 9	July 10	Aug. 8

82. Harbinger(Sutton), **F.C.C.** 1872.—Described vol. xxxvi. p. 713.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second ,, . .	May 13	June 13	July 4
Third ,, . .	June 9	?	Aug. 5

83. Harvestman (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv. p. 289.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 6	June 26
Second ,, . .	May 13	June 23	Aug. 5
Third ,, . .	June 9	July 16	Aug. 13

84. Hundredfold (Sutton), **A.M.** July 5, 1910.—Described vol. xxxvi. p. 713.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	May 30	June 23
Second ,, . .	May 13	June 16	July 7
Third ,, . .	June 7	?	Aug. 11

85. Ideal (Sutton), **F.C.C.** July 3, 1903.—Described vol. xxxvi. p. 713.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 20
Second ,, . .	May 15	June 13	July 4
Third ,, . .	June 9	Failed.	—

86. Ideal, Dwarf (Cannell).—With the exception of the height being one foot less and haulm and pods being a darker colour, this variety is identical with No. 85.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 1	July 3
Second ,, . .	May 15	June 19	July 18
Third ,, . .	June 9	July 21	Aug. 13

87. Incomparable (Sutton).—Described vol. xxxvi. p. 717.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 10	July 3
Second ,, . .	May 15	July 3	July 23
Third ,, . .	June 7	July 23	Aug. 19

88. International (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv. p. 289.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 31	June 26
Second ,, . .	May 13	June 23	July 18
Third ,, . .	June 7	July 16	Aug. 13

89. Invincible Marrowfat (Sutton).—Described vol. xxxvi. p. 720.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 6	July 3
Second ,, . .	May 15	June 26	July 16
Third ,, . .	June 9	Failed.	—

90. James Holmes (Holmes).—Described vol. xxxvii. p. 413.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 28	June 19
Second ,, . .	May 16	June 16	July 4
Third ,, . .	June 9	July 10	Aug. 8

210. James Kelway (Kelway).—Height $3\frac{1}{2}$ feet; haulm dark green, fairly strong; pods in pairs, dark green, $3\frac{3}{4}$ inches long, each containing seven large peas.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 10	July 4
Second ,, . .	May 15	July 3	July 23
Third ,, . .	June 7	?	Aug. 19

211. John Downie (Staward).—Height $3\frac{1}{2}$ feet; haulm dark green, fairly strong; pods in pairs, dark green, $4\frac{1}{2}$ inches long, straight with curved end, each containing six large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 4
Second ,, . .	May 13	July 4	July 28
Third ,, . .	June 7	July 21	Aug. 19

91. King Alfred (Breadmore).—Height $2\frac{1}{2}$ feet; haulm dark green, fairly strong; pods in pairs, dark green, 4 inches long, slightly curved, each containing seven or eight large peas; seed wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 9	July 3
Second ,, . .	May 15	June 16	July 5

92. King of the Dwarfs (Sutton).—Described vol. xxxvi. p. 714.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second ,, . .	May 13	June 13	July 4
Third ,, . .	June 9	July 10	Aug. 8

93. Lancastrian (Dickson and Robinson).—Described vol. xxxvii. p. 414.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 10	July 3
Second ,, . .	May 15	July 3	July 23
Third ,, . .	June 11	July 28	Crop failed.

94. Langley Gem (J. Veitch).—Described vol. xxxvii. p. 414.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 27	June 19
Second ,, . .	May 15	June 13	July 4
Third ,, . .	June 7	July 4	Aug. 5

95. Late Queen (Sutton), **A.M.** July 10, 1900.—Described vol. xxxvi. p. 725.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 9	June 18	July 7
Second ,, . .	May 15	July 3	Aug. 5
Third ,, . .	June 9	Aug. 5	Failed.

96. Latest Giant (Carter).—Described vol. xxxvii. p. 414. Stock requires considerable selection. Crop light.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 10	June 11	July 7
Second „ . .	*May 16	July 3	Aug. 5
Third „ . .	June 9	July 28	Failed.

97. Laxtonian (Dobbie), **A.M.** July 5, 1910.—Described vol. xxxvi. p. 714.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	May 28	June 23
Second „ . .	May 13	June 16	July 16
Third „ . .	June 9	Failed.	—

98. Laxtonian, re-selected (Hurst).—See No. 97.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 28	June 23
Second „ . .	May 15	Failed.	—

99. Little Marvel (Barr), **A.M.** July 11, 1902.—Described vol. xxxvi. p. 714.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 30	June 23
Second „ . .	May 15	June 18	July 5
Third „ . .	June 7	July 12	Aug. 8

100. Little Marvel (Carter), **A.M.** July 11, 1902.—See No. 99.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 30	June 23
Second „ . .	May 15	June 18	July 4
Third „ . .	June 9	July 12	Aug. 5

101. Little Marvel (Sutton), **A.M.** July 11, 1902.—See No. 99.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 30	June 23
Second „ . .	May 13	June 18	July 5
Third „ . .	June 12	Failed.	—

102. Little Marvel (R. Veitch), **A.M.** July 11, 1902.—See No. 99.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 30	June 23
Second „ . .	May 13	June 18	July 5
Third „ . .	June 9	July 12	Aug. 5

103. Longstander (Sutton).—Height 5 feet; haulm light green, weak; pods mostly in pairs, light green, 4 inches long, straight with blunt end, each containing six fair-sized peas; seed, wrinkled, green; germination bad.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 14	June 18	July 16
Second „ . .	May 16	July 7	Failed.
Third „ . .	Failed.	—	—

104. Lord Rosebery (J. Veitch).—Height 3 feet; haulm dark green, fairly strong; pods in pairs, dark, 4½ inches long, straight with curved ends, each containing seven fairly large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 10	July 4
Second „ . .	May 13	July 3	Aug. 5
Third „ . .	June 10	Failed.	—

105. Magnum Bonum (Sutton), **XXX** July 7, 1913.—Described vol. xxxvi. p. 721.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 6	July 3
Second „ . .	May 14	June 24	July 28
Third „ . .	June 11	Failed.	—

106. Maincrop (Sutton).—Described vol. xxxvi. p. 721.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 16	July 4
Second „ . .	May 14	July 3	Aug. 5
Third „ . .	June 9	July 29	Aug. 21

107. Majestic (Barr).—Described vol. xxxvi. p. 721.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 12	June 9	July 7
Second „ . .	May 13	July 4	Failed
Third „ . .	June 9	Failed.	—

108. Marchioness (Sharpe).—Height 3½ feet; haulm light green, sturdy; pods mostly in pairs, light green, 3½ inches long, straight, each containing seven fairly large peas; seeds wrinkled, green. The stock requires selection; pods very variable in size.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 27	June 19
Second „ . .	May 13	June 13	July 3
Third „ . .	June 9	July 7	Failed.

109. Market Favourite (Sutton).—Described vol. xxxvi. p. 721.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	June 6	June 26
Second „ . .	May 15	June 26	July 18
Third „ . .	June 7	July 18	Aug. 13

110. Market Gardener (Carter).—Height 5½ feet; haulm dark green, strong; pods mostly single, dark green, 4 inches long, straight with curved end, each containing nine large peas; seeds wrinkled, green. Crop poor.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 31	June 24
Second „ . .	May 15	June 18	July 16
Third „ . .	June 7	July 10	Aug. 13

111. Market Surprise (Hurst).—Height 3½ feet; haulm light green, weak; pods borne mostly in pairs, light green, 3 inches long, curved, each containing seven large peas; seeds round, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 20
Second „ . .	May 15	June 13	July 7
Third „ . .	June 7	July 4	Aug. 5

112. Marquis of Stafford (Holmes), **XXX** July 7, 1913.—Height 5 feet; haulm dark green, weak; pods borne mostly in pairs, dark, 4 inches long, straight with blunt end, each containing six large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	June 6	July 3
Second „ . .	May 15	June 23	July 17
Third „ . .	Failed.	—	—

113. Marvellous (Hurst).—Height 1½–2 feet; haulm light green, fairly strong; pods borne in pairs and singly, light green, 3 inches long, straight with blunt end, each containing six large peas; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 28	June 23
Second „ . .	May 15	June 16	July 4
Third „ . .	June 7	July 9	Aug. 8

114. Marvellous (R. Veitch).—See No. 113, but haulm and pods dark green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 30	June 20
Second „ . .	May 15	June 16	July 7
Third „ . .	June 6	July 10	Aug. 8

115. Masterpiece (Sutton), **A.M.** July 15, 1913.—Described vol. xxxvi. p. 721.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 3
Second „ . .	May 15	July 3	July 28
Third „ . .	June 10	Failed.	—

116. Masterpiece (J. Veitch).—See No. 115.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 13	July 4
Second „ . .	May 13	July 3	Aug. 5
Third „ . .	June 9	July 23	Aug. 19

117. Matchless (Sutton), **A.M.** July 18, 1911.—Described vol. xxxvi. p. 721.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 13	July 7
Second „ . .	May 15	July 3	Aug. 5
Third „ . .	June 10	Failed.	—

118. Mayflower (Carter).—Described vol. xxxiv. p. 289.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 31	June 23
Second „ . .	May 13	June 18	July 10
Third „ . .	June 9	July 12	Aug. 5

119. May Queen (Sutton).—Described vol. xxxvi. p. 714. Crop light.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 27	June 19
Second „ . .	May 13	June 13	July 4
Third „ . .	June 11	Failed.	—

120. Meteor (Sharpe).—Height 1 foot; haulm dark green, weak; pods mostly in pairs, dark green, 3 inches long, curved, each containing seven large peas; seeds round, blue.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second „ . .	May 13	June 13	July 4
Third „ . .	June 6	?	Aug. 5

121. Michaelmas (Carter).—Described vol. xxxvi. p. 725.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 18	July 7
Second „ . .	May 13	July 3	Aug. 11
Third „ . .	June 7	Aug. 8	Failed.

122. Monster-podded Sugar Pea (Barr).—Described vol. xxxvii. p. 415. A few rogues.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 11	July 7
Second ,, . .	May 13	July 3	July 29
Third ,, . .	June 7	July 28	Aug. 19

123. Ne Plus Ultra (Sutton).—Described vol. xxxvi. p. 722.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 3
Second ,, . .	May 15	July 3	Aug. 8
Third ,, . .	June 9	Failed.	—

124. Omega (Carter), **F.C.C.** 1872.—See No. 125.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 7
Second ,, . .	May 15	July 3	July 21
Third ,, . .	June 7	July 28	Aug. 20

125. Omega (improved) (Carter), **F.C.C.** 1872.—Described vol. xxxvi. p. 722.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 3
Second ,, . .	May 15	July 3	Aug. 8
Third ,, . .	June 9	Failed.	—

212. Orwell (Staward), **XXX** July 7, 1913.—Height 3 feet; haulm dark green, strong; pods borne mostly in pairs, dark green, 3½ inches long, inflated, curved, each containing six large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 10	July 4
Second ,, . .	May 13	July 3	July 23
Third ,, . .	June 7	July 4	Aug. 19

126. Passport (Hurst).—Height 2½ feet; haulm strong, dark green; pods borne mostly in pairs, dark, 4 inches long, curved, inflated, each containing six large peas; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 7	July 3
Second ,, . .	May 15	June 24	July 23
Third ,, . .	June 10	Failed.	—

127. Peerless (Sutton), **F.C.C.** July 14, 1903.—Described vol. xxxvi. p. 722.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 3	June 7	July 3
Second ,, . .	May 15	July 3	July 21
Third ,, . .	June 7	July 21	Aug. 19

128. Perfection, re-selected (Carter), **A.M.** July 14, 1897.—See description vol. xxxvi. p. 722, but this stock is dwarfer.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 13	July 4
Second ,, . .	May 13	July 3	Aug. 8
Third ,, . .	June 9	Failed.	—

129. Perfection (Sutton), **A.M.** July 14, 1897.—Described vol. xxxvi. p. 722.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 6	July 3
Second ,, . .	May 13	July 7	July 21
Third ,, . .	June 10	Failed.	—

130. Perpetual (Sutton).—Described vol. xxxvii. p. 416.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 9	June 13	July 4
Second „ . .	May 15	July 3	Aug. 5
Third „ . .	June 9	Failed.	—

131. Peter Pan (Barr).—Height 1½–2 feet; haulm light green, fairly strong; pods borne mostly singly, light green, 3¼ inches long, inflated, curved, each containing five large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 28	June 23
Second „ . .	May 15	June 16	July 7
Third „ . .	June 7	July 12	Aug. 8

132. Pilot, re-selected (Hurst), **A.M.** July 3, 1903.—Described vol. xxxiv. p. 289.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 2	May 26	June 19
Second „ . .	May 15	June 13	July 3
Third „ . .	June 7	July 4	Aug. 5

133. Pioneer (Sutton).—Described vol. xxxvi. p. 714.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 9	May 30	June 19
Second „ . .	May 15	June 20	July 7
Third „ . .	June 7	July 10	Aug. 13

134. Premier (Bell & Bieberstedt), **A.M.** July 18, 1911.—Described vol. xxxvii. p. 406.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 9	July 3
Second „ . .	May 16	June 20	July 16
Third „ . .	June 10	July 21	Aug. 13

213. Prime Minister (Staward).—Height 7 feet; haulm light green, strong; pods mostly in pairs, light green, 4¼ inches long, curved, inflated, each containing seven large peas; seeds wrinkled, green. A different pea from that described under this name in vol. xxxvii., p. 417.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 9	July 4
Second „ . .	May 13	June 26	July 25
Third „ . .	June 7	July 18	Aug. 28

135. Primo (Barr).—Described vol. xxxvii. p. 417.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 27	June 19
Second „ . .	May 13	June 11	July 3
Third „ . .	June 7	July 4	Aug. 8

136. Prince of Peas (Sutton), **A.M.** August 2, 1910.—Described vol. xxxvi. p. 717.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 6	July 3
Second „ . .	May 13	June 24	July 18
Third „ . .	June 7	July 23	Failed.

137. Prince of Wales (Sutton).—Described vol. xxxvi. p. 718.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 12	June 6	June 26
Second „ . .	May 18	June 26	?
Third „ . .	June 7	July 18	Aug. 8

138. Prizewinner (Dobbie), **F.C.C.** July 5, 1901.—Described vol. xxxvi. p. 718.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 7	July 7
Second „ . .	May 15	June 24	July 31
Third „ . .	June 9	July 29	Failed.

139. Prizewinner (Sutton), **F.C.C.** July 5, 1901.—See No. 138.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 11	July 4
Second „ . .	May 16	July 3	July 30
Third „ . .	June 13	Failed.	—

140. Prodigy (J. Veitch), **F.C.C.** July 10, 1885.—Height 6 feet; haulm strong, dark; pods mostly in pairs, dark, 4½ inches long, curved, inflated, each containing nine fair-sized peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 6	June 26
Second „ . .	May 13	June 23	July 16
Third „ . .	June 7	July 18	Aug. 8

141. Quite Content (Carter), **F.C.C.** August 14, 1906.—Described vol. xxxiv. p. 290.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 7	June 26
Second „ . .	May 13	June 23	July 18
Third „ . .	June 7	July 16	Aug. 13

142. Quite Content (Dobbie), **F.C.C.** August 14, 1906.—See No. 141.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 9	June 26
Second „ . .	May 15	June 23	July 16
Third „ . .	June 10	Failed.	—

143. Reading Wonder (Sutton).—Described vol. xxxvi. p. 714.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second „ . .	May 13	June 13	July 4
Third „ . .	June 9	July 4	Aug. 5

144. Rearguard (A. Dickson).—Described vol. xxxvi. p. 725.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 18	July 19
Second „ . .	May 13	July 5	Failed.
Third „ . .	June 9	Failed.	—

145. Rearguard (Hurst).—See No. 144.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 16	July 16
Second „ . .	May 15	July 7	Aug. 11
Third „ . .	June 9	Failed.	—

146. Ringleader, improved (Sutton).—Described vol. xxxvii. p. 418.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 2	May 26	June 19
Second „ . .	May 15	June 13	July 3
Third „ . .	June 7	July 4	Aug. 5

147. Royal Salute (R. Veitch).—Height 3½ feet; haulm strong, dark green; pods borne mostly in pairs, dark green, 4¼ inches long,

curved, inflated, each containing six large peas; seeds wrinkled, green. Stock requires selection for height.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 10	June 13	July 4
Second ,, . .	May 15	July 3	July 30
Third ,, . .	Failed.	—	—

148. Sangster's No. 1 (Sutton).—Described vol. xxxvi. p. 714.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second ,, . .	May 15	June 13	?
Third ,, . .	June 7	July 4	Aug. 5

149. Satisfaction (Sutton).—Height 2½–3 feet; haulm strong, dark green; pods borne mostly in pairs, light green, inflated, 4 inches long, straight with blunt end, each containing six large peas; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 11	June 10	July 5
Second ,, . .	May 16	July 3	July 30
Third ,, . .	June 13	Failed.	—

150. Saxa (Hurst).—Height 4 feet; haulm weak, light green; pods borne mostly in pairs, light green, inflated, curved, 3 inches long, each containing five small peas; seeds round, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 27	June 19
Second ,, . .	May 15	June 11	July 3
Third ,, . .	June 7	July 4	Aug. 5

151. Seedling (Sutton).—Height 1½ foot; haulm light green, weak; pods borne singly, light green, 3½ inches long, straight with curved ends, inflated, each containing five fair-sized peas; seeds wrinkled, green. Stock requires selection. Germination poor.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 28	June 23
Second ,, . .	May 4	June 16	Crop failed
Third ,, . .	June 7	July 7	Aug. 8

152. Sir Arthur Bignold (Holmes), **A.M.** July 15, 1913.—Height 5½ feet; haulm strong, dark; pods borne in pairs, dark, inflated, 4 inches long, curved, each containing eight large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 7	July 4
Second ,, . .	May 13	June 23	July 18
Third ,, . .	June 7	July 18	Failed.

214. Sir Henry (Staward).—Height 3 feet; haulm weak, dark green; pods mostly in pairs, dark, inflated, 4½ inches long, straight with curved end, each containing six fair-sized peas.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 9	June 10	July 3
Second ,, . .	May 13	July 3	July 23
Third ,, . .	June 10	Failed.	—

215. Sir Herbert (Staward).—Height 3 feet; haulm fairly strong, dark green; pods mostly in pairs, dark, not inflated, 4 inches long,

straight with curved end, each containing seven large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 12	June 10	July 4
Second „ . .	May 13	July 4	July 23
Third „ . .	June 7	July 21	Aug. 19

153. Snowdrop (Carter), **A.M.** July 30, 1908.—Described vol xxxvii. p. 420.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 28	June 20
Second „ . .	May 13	June 16	July 4
Third „ . .	June 9	Failed.	—

154. Springtide (Carter).—Described vol. xxxvi. p. 715. Stock needs selection.

	Above ground.	In flower.	Ready to pick.
First Sowing . . .	April 5	May 27	June 23
Second „ . . .	May 13	June 13	July 7
Third „ . . .	Failed.	—	—

155. St. Desirat (Barr).—Described vol. xxxvii. p. 420.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 13	July 4
Second „ . .	May 13	July 4	July 30
Third „ . .	June 7	July 19	Aug. 19

156. St. Duthus (Holmes), **F.C.C.** July 14, 1887.—Height 4 feet; haulm strong, dark green; pods in pairs, dark, inflated, curved, 4 inches long, each containing eight large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 9	June 11	July 5
Second „ . .	May 13	July 3	July 30
Third „ . .	June 9	July 29	Aug. 20

157. Standwell (Sutton).—Described vol. xxxvii. p. 420.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 13	July 4
Second „ . .	May 13	July 3	July 30
Third „ . .	June 9	Failed.	—

158. Stratagem (Carter), **F.C.C.** July 7, 1882.—Described vol. xxxvi. p. 718.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 9	July 10
Second „ . .	May 15	June 26	July 30
Third „ . .	June 10	Failed.	—

159. Stratagem, selected (Dobbie), **F.C.C.** July 7, 1882.—See No. 158.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 19
Second „ . .	May 15	July 3	July 29
Third „ . .	June 9	July 28	Aug. 16

160. Stratagem (Sutton), **F.C.C.** July 7, 1882.—See No. 158.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 10	June 10	July 7
Second „ . .	May 13	July 3	July 21
Third „ . .	June 11	Failed.	—

161. Stratagem, re-selected (Carter), **F.C.C.** July 7, 1882.—See No. 158.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 9	June 13	July 3
Second ,, . .	May 15	July 3	July 21
Third ,, . .	June 7	July 23	?

162. Sugar Pea, dwarf Brittany (Barr).—Height 3 feet; haulm strong, dark green; pods mostly in pairs, dark, 2½ inches long, straight with blunt end; each containing seven small peas; seeds round, white; some rogues.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 18	July 4
Second ,, . .	May 15	July 3	?
Third ,, . .	June 7	July 29	Aug. 20

163. Superb (Laxton), **A.M.** July 15, 1913.—Described vol. xxxvii. p. 420.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	May 30	June 23
Second ,, . .	May 13	June 16	July 7
Third ,, . .	June 9	July 12	Aug. 5

164. Superlative (Sutton), **F.C.C.** 1872.—Described vol. xxxvi. p. 718.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 9	July 3
Second ,, . .	May 13	June 26	Aug. 5
Third ,, . .	June 9	Failed.	—

165. Talisman (Sharpe).—Described vol. xxxvii. p. 421.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 23
Second ,, . .	May 15	June 13	July 7
Third ,, . .	June 7	July 4	Aug. 8

166. Telephone (Dobbie), **F.C.C.** June 27, 1878.—A paler and less robust form of the variety described vol. xxix. p. 686.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 10	July 3
Second ,, . .	May 15	June 26	July 18
Third ,, . .	June 7	July 18	Aug. 13

167. Telephone (Sutton), **F.C.C.** June 27, 1878.—Described vol. xxix. p. 686.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 6	June 26
Second ,, . .	May 13	June 23	July 18
Third ,, . .	June 7	July 18	Aug. 13

168. The Argyle (Campbell).—Height 5½ feet; haulm light green, fairly strong, pods mostly in pairs, light green, inflated, curved, 4 inches long, each containing eight fair-sized peas; seeds wrinkled, green

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 31	July 3
Second ,, . .	May 13	June 18	July 12
Third ,, . .	June 7	July 10	Aug. 8

169. The Bell (Dobbie), **A.M.** August 15, 1905.—Described vol. xxxvi. p. 723.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 10	July 5
Second ,, . .	May 13	July 3	Aug. 5
Third ,, . .	June 7	July 28	Failed.

170. The Comet (Sharpe).—Height 3 feet; haulm weak, light green; pods mostly in pairs, light green, inflated, curved, 3 inches long, each containing eight peas, large; seeds round, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 26	June 20
Second „ . .	May 13	June 13	July 4
Third „ . .	June 7	July 4	Aug. 5

171. The Clipper (Sydenham), **XXX** July 7, 1913.—Described vol. xxxvi. p. 718.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 6	July 3
Second „ . .	May 15	June 26	July 23
Third „ . .	June 7	July 23	Aug. 19

208. The Langport (Kelway).—Height 5½ feet; haulm fairly strong, light green; pods mostly in pairs, light green, 4½ inches long, curved, inflated, each containing seven large peas; seeds wrinkled, white. Stock is in need of selection, especially for height.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 9	July 4
Second „ . .	May 15	June 26	July 29

217. The London (Nutting).—Height 3 feet; haulm strong, dark; pods mostly in pairs, dark, inflated, variable in shape, 4 inches long, each containing eight large peas.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 14	June 13	July 7
Second „ . .	May 13	July 14	Aug. 8

172. The Peer (Dickson & Robinson).—Height 2½ feet; haulm strong, dark; pods borne mostly singly, dark, curved, not inflated, 4 inches long, each containing six fair-sized peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 10	July 3
Second „ . .	May 13	July 3	Crop failed
Third „ . .	June 10	July 28	Crop failed.

173. The Pilot, re-selected (Carter), **A.M.** July 3, 1903.—Described vol. xxxvi. p. 715, but read: seeds round, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second „ . .	May 13	June 13	July 3
Third „ . .	June 7	July 4	Aug. 5

174. The Pilot (A. Dickson), **A.M.** July 3, 1903.—See No. 173.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 19
Second „ . .	May 15	June 13	July 4
Third „ . .	June 7	July 4	Aug. 13

175. The Pilot (Dobbie), **A.M.** July 3, 1903.—See No. 173.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second „ . .	May 15	June 13	July 4
Third „ . .	June 7	July 4	Aug. 13

176. The Scout (Holmes).—Height 4 feet; haulm light green, fairly strong; pods both in pairs and single, light green, inflated,

straight, 3¾ inches long, each containing seven large peas; seeds round, blue.

	Above ground	In flower.	Ready to pick.
First Sowing . .	April 5	May 26	June 19
Second „ . .	May 3	June 13	July 4
Third „ . .	June 7	?	Aug. 11

177. The Sherwood (Dobbie).—Height 18 inches; haulm strong, dark; pods mostly in pairs, dark, inflated, straight with blunt end, 3 inches long, each containing five large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 10	June 2	July 3
Second „ . .	May 16	June 18	July 20
Third „ . .	June 10	?	Aug. 8

178. Thomas Laxton (Sutton).—Described vol. xxxvi. p. 715.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 2	June 20
Second „ . .	May 15	June 13	July 4
Third „ . .	June 9	July 4	Aug. 5

179. Up to Date (Sutton), **XXX** July 7, 1913.—Height 5½ feet; haulm fairly strong; pods borne singly, light green, 5¼ inches long, straight with curved ends, inflated, each containing seven large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	June 6	July 3
Second „ . .	May 15	June 24	July 23
Third „ . .	June 7	July 18	Aug. 13

180. Vanguard (A. Dickson).—Described vol. xxxvii. p. 423.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 19
Second „ . .	May 15	June 13	July 3
Third „ . .	June 7	July 4	Aug. 5

181. Vanguard (Sharpe).—See No. 180. This is a darker form of that variety and requires selection for height and for shape and size of pods.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 20
Second „ . .	May 13	June 13	July 3
Third „ . .	June 7	July 4	Aug. 8

182. Veitch's Perfection (Sutton).—Described vol. xxxvi. p. 724.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 16	July 16
Second „ . .	May 13	July 3	Aug. 5
Third „ . .	June 9	Aug. 5	Failed

183. Veitch's Perfection (R. Veitch).—See No. 182.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 6	July 7
Second „ . .	May 13	July 3	Aug. 5
Third „ . .	June 10	Failed.	—

184. Victor (J. Veitch), **A.M.** July 5, 1910.—Described vol. xxxvi. p. 715.

	Above ground.	In flower.	Ready to pick
First Sowing . .	April 4	May 26	June 19
Second „ . .	May 13	June 13	July 3
Third „ . .	June 6	July 4	July 29

185. Warriston Wonder (Bell & Bieberstedt), **A.M.** July 15, 1913.—

Height 6½ feet; haulm strong, dark; pods mostly in pairs, dark, 4½ inches long, inflated, straight or little curved, each containing six or seven large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 26	July 3
Second ,, . .	May 13	June 20	Aug. 5
Third ,, . .	June 10	Failed.	—

186. Western Express (R. Veitch), **A.M.** July 11, 1892.—Described vol. xxxvi. p. 715.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 30	June 23
Second ,, . .	May 13	June 18	July 10
Third ,, . .	June 7	?	Aug. 5

187. William I. improved (Sutton), **F.C.** 1872.—A dark form of the variety described vol. xxxvi. p. 715.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 27	June 23
Second ,, . .	May 13	June 16	July 10
Third ,, . .	June 7	?	Aug. 5

188. William Hurst (Sutton).—Described vol. xxxiv. p. 289.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 28	June 20
Second ,, . .	May 13	June 16	July 5
Third ,, . .	June 10	Failed.	—

189. Wintonian (Breadmore).—Height 4 feet; haulm strong, dark; pods mostly in pairs, dark, curved, inflated, 4½ inches long, each containing seven fair-sized peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 18	July 5
Second ,, . .	May 15	July 5	Aug. 5

190. World's Record (Sutton).—Described vol. xxxvi. p. 716.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 26	June 19
Second ,, . .	May 15	June 11	July 3
Third ,, . .	June 9	July 10	Aug. 8

191. Wrinkled Marrow (Holmes).—Height 5½ feet; haulm strong, light green; pods mostly in pairs, light green, inflated, straight with curved end, 4½ inches long, each containing seven fair-sized peas.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 7	July 3
Second ,, . .	May 13	June 23	July 12
Third ,, . .	Failed.	—	—

192. Yorkshire Hero (Sutton), **A.M.** August 16, 1910.—Described vol. xxxvi. p. 724, but only 2½ feet high. Stock requires selection.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 9	July 3
Second ,, . .	May 15	June 24	July 16
Third ,, . .	June 10	Aug. 8	Failed.

193. No. 336 (Hurst).—Height 12–15 inches; haulm strong and very tough, dark; pods single, light green, nearly straight, very inflated, 3 inches long, each containing seven fair-sized peas; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 27	June 19
Second ,, . .	May 13	June 13	July 7
Third ,, . .	June 6	?	Aug. 5

194. No. 763 (Hurst).—Height 2½ feet; haulm strong, light green; pods mostly in pairs, light green, curved, inflated, 3½ inches long, each containing five large peas; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 19
Second ,, . .	May 13	June 13	July 4
Third ,, . .	June 7	July 4	Aug. 5

195. No. 825 (Hurst).—Height 2½ feet; haulm dark, strong; pods both singly and in pairs, dark green, curved, not inflated, 4 inches long, each containing seven fair-sized peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 9	June 26
Second ,, . .	May 15	June 26	July 29
Third ,, . .	June 7	July 26	Aug. 19

196. No. 1044 (Hurst).—Height 2½ feet; haulm light green, thin but wiry; pods borne singly, light green, straight with blunt end, 2¼ inches long, inflated, each containing seven fair-sized peas seeds round, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 19
Second ,, . .	May 15	June 11	July 3
Third ,, . .	June 7	July 4	July 30

197. No. 3879 (Hurst), **A.M.** July 15, 1913.—Height 1 foot; haulm strong, light green; pods mostly in pairs, light green, curved, inflated, each containing five or six large peas; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 27	June 23
Second ,, . .	May 13	June 11	July 7
Third ,, . .	June 9	July 4	Aug. 5

198. No. 3880 (Hurst).—Height 3 feet; haulm strong, dark; pods borne mostly in pairs, dark, straight with curved end, not inflated, 3½ inches long, each containing seven large peas; seeds round, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	June 10	July 3
Second ,, . .	May 13	June 11	July 4

199. No. 3948 (Hurst).—Height 3 feet; haulm strong, dark; pods borne mostly in pairs, dark, curved, inflated, 3½ inches long, each containing seven large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 4	July 3
Second ,, . .	May 3	June 24	Aug. 5
Third ,, . .	Failed.	—	—

200. No. 3949 (Hurst).—Height 18 inches; haulm fairly strong, light green; pods both singly and in pairs, light green, curved, inflated, 2½ inches long, each containing six large peas; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 30	June 20
Second ,, . .	May 13	June 18	July 18
Third ,, . .	June 6	July 10	Aug. 8

201. No. 3951 (Hurst).—Height 4 feet; haulm fairly strong, dark; pods mostly in pairs, light green, curved, inflated, $4\frac{1}{4}$ inches long, each containing eight large peas; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	June 11	July 5
Second ,, . .	May 13	July 3	July 28

202. No. 3952 (Hurst).—Height $2\frac{1}{2}$–3 feet; haulm thin and weak, light green; pods borne mostly in pairs, dark, inflated, straight, with blunt end, 3 inches long, each containing five or six large peas; seeds round, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 4	May 24	June 19
Second ,, . .	May 13	June 13	July 5
Third ,, . .	?	July 4	Aug. 5

203. No. 3953 (Hurst).—Height 18 inches; haulm strong, dark; pods mostly in pairs, dark, curved, inflated, $3\frac{1}{2}$ inches long, each containing five fair-sized peas; seeds round, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 7	May 31	June 23
Second ,, . .	May 15	June 18	July 20
Third ,, . .	June 7	July 12	Aug. 5

204. No. 3959 (Hurst).—Height $2\frac{1}{2}$–3 feet; haulm weak, light green; pods borne singly, light green, curved, inflated, 4 inches long, each containing seven large peas; seeds wrinkled, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 4	June 23
Second ,, . .	May 15	June 24	July 16

205. No. 3960 (Hurst).—Height 18 inches; haulm fairly strong, dark; pods borne singly, dark, straight, with a blunt end, inflated, 3 inches long, each containing five large peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 8	May 31	July 5
Second ,, . .	May 13	June 18	July 21
Third ,, . .	June 9	July 12	Aug. 13

206. No. 14019 (Hurst).—Height 5 feet; haulm weak, light green; pods borne singly, light green, straight with blunt end, inflated, $3\frac{3}{4}$ inches long, each containing seven large peas; seeds round, white.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	June 6	June 24
Second ,, . .	May 15	June 18	July 16
Third ,, . .	June 7	July 7	Aug. 5

207. No. 14035 (Hurst).—Height 4 feet; haulm dark, strong; pods borne in pairs, dark green, straight, with blunt end, inflated, 3 inches long, each containing seven fair-sized peas; seeds wrinkled, green.

	Above ground.	In flower.	Ready to pick.
First Sowing . .	April 5	May 27	June 19
Second ,, . .	May 15	June 18	July 20
Third ,, . .	June 7	July 7	Failed.

POTATOS AT WISLEY, 1913.

SIXTY-FIVE stocks of potatos were received for trial. These were planted on April 21, in soil that had been deeply dug and moderately manured during the previous winter. In nearly all the stocks the growth was vigorous, in spite of a long period of drought; they all produced good crops, with little disease. In comparison with some of the well-known varieties in commerce, there does not seem to be much advance in the new varieties sent for trial. The Fruit and Vegetable Committee examined the collection on three occasions, and by reason of their good crop and handsome appearance ordered the following varieties to be cooked, viz.:

'Great Scot.'	'Surprise.'
'Irish King.'	'Raynes Park White.'
'Southern Star.'	'Western Hero.'

F.C.C.=First-class Certificate.
A.M. = Award of Merit.
XXX = Highly Commended.

LIST OF VARIETIES.

*1. Duke of York.
2. Lady Llewelyn.
3. Dalmeny Early.
4. Epicure.
5. Early Ashleaf Improved.
6. No. 10.
7. Early Favourite.
8. Eightyfold.
9. Midlothian Early.
10. Mark's Tey Early.
11. Atlanta.
12. Ashleaf Kidney.
13. Early Puritan.
14. Western Hero.
15. Midlothian Early.
16. Excelsior.
17. First Crop.
18. Surprise.
19. Sir John Llewelyn.
20. Sharpe's Express.
21. Sir John Llewelyn re-selected.
22. Tuns.
23. Windsor Castle.
24. Elma.
25. Morna.
26. Cigarette.
27. Irish King.
28. Scottish Chief.
29. Imperial Beauty.
30. Great Scot.
31. Conquest.
32. Exhibition Red Kidney.
33. British Queen.
34. Dobbie's Favourite.
35. British Queen.
36. The Winder's Pride.
37. Lounnersom Abundance.
38. Norfolk Beauty.
39. Surprise.
40. Arran Chief.
41. Raynes Park White.
42. Pride of Lincolnshire.

* See footnote, p. 636.

43. The Diamond.
44. Mayflower.
45. The Colleen.
46. The Factor.
47. Defiance.
48. Duchess of Cornwall.
49. International Gem.
50. Defiance.
51. His Majesty.
52. Queen Mary.
53. No. 20.
54. King of the Russets.
55. Gold Finder.
56. Invicta.
57. Snowball.
58. Southern Star.
59. Vitality.
60. Aristocrat.
61. Bonnie Dundee.
62. Devon Champion.
63. The Cottar.
64. The Chapman.
65. The Admiral.

Early Varieties.

12. Ashleaf Kidney (R. Veitch).—Haulm fairly strong, spreading, light green. Tubers medium-sized kidney, eyes shallow, eyebrows indistinct, skin smooth. Crop fairly good and free from disease.

11. Atlanta (Heinemann).—Haulm spreading, light green. Tubers ovate, size medium, eyes shallow, eyebrows not pronounced, skin russet. Crop light and badly diseased.

33. British Queen (Dobbie), **A.M.** August 15, 1905.—See vol. xxxviii. p. 566.

35. British Queen (J. Veitch).—Similar to No. 33.

26. Cigarette (Barr), **A.M.** November 21, 1905.—See vol. xxxvii. p. 570.

3. Dalmeny Early (Barr), **A.M.** September 13, 1910.—See vol. xxxviii. p. 567. Crop moderate and free from disease.

1. Duke of York (R. Veitch).—See vol. xxxviii. p. 567.

5. Early Ashleaf Improved (Carter).—Haulm dark green, spreading. Tubers kidney-shaped, medium, skin russet, eyes shallow, eyebrows not prominent. Crop fair and free from disease.

7. Early Favourite (Carter).—Haulm strong and erect in growth, light green. Tubers medium, round, eyes deep, eyebrows pronounced, skin russet. Crop good and free from disease.

13. Early Puritan (R. Veitch), **A.M.** August 16, 1900.—See vol. xxxvii. p. 570.

8. Eightyfold (Dobbie).—Haulm spreading in habit. Tubers of good size, round, eyes shallow, eyebrows distinct, skin purplish. Crop very good and free from disease.

24. Elma (Kime).—Haulm strong and of erect growth, dark green. Tubers flat kidney of good size, eyes shallow, eyebrows not prominent. Crop heavy and free from disease.

4. Epicure (Barr), **A.M.** August 15, 1905.—See vol. xxxviii. p. 567.

16. Excelsior (Carter).—Haulm fairly strong and of spreading habit, dark green. Tubers small, round, eyes deep, eyebrows indistinct, skin smooth. Crop medium and very slightly affected with disease.

32. Exhibition Red Kidney (Dobbie).—Haulm fairly strong, dark

green. Tubers large, long flat, eyes very shallow, eyebrows slightly pronounced, skin smooth, reddish purple. Crop good and free from disease.

17. First Crop (Carter).—Haulm spreading in habit and fairly strong, light green. Tubers of good size, flat kidney, eyes very shallow, eyebrows fairly pronounced. Crop heavy, not diseased.

29. Imperial Beauty (Barr).—See vol. xxxvii. p. 570.

27. Irish King (Barr), **A.M.** August 26, 1913.—Haulm light green, strong. Tubers of good size, flat kidney, eyes shallow, eyebrows fairly distinct, skin slightly russet. Crop good and free from disease.

2. Lady Llewelyn (R. Veitch).—See vol. xxxviii. p. 567.

10. Mark's Tey Early (Dobbie).—Haulm fairly strong, light green, spreading. Tubers of good size, round, eyes shallow, eyebrow indistinct, skin smooth. Crop fairly good, not diseased.

9. Midlothian Early (Dobbie), **A.M.** July 31, 1908.—See vol. xxxviii. p. 567.

15. Midlothian Early (Sydenham).—Similar to No. 9.

6. No. 10 (Carter).—Haulm fairly strong and of erect habit, light green. Tubers medium, round ovate, eyes deep, eyebrows faint, skin smooth. Crop fairly good, and free from disease.

28. Scottish Chief (Barr).—See vol. xxxvii. p. 571.

20. Sharpe's Express (Dobbie), **A.M.** August 13, 1901.—See vol. xxxviii. p. 568.

19. Sir John Llewelyn (Dobbie), **A.M.** September 11, 1900.—See vol. xxxviii. p. 568.

21. Sir John Llewelyn [re-selected] (J. Veitch).—Similar to No. 19.

18. Surprise (Carter), **XXX** July 21, 1913.—Haulm fairly strong, spreading, light green. Tubers medium, kidney, eyes very shallow, eyebrows indistinct, skin russet. Crop good, very slightly diseased.

39. Surprise (Daniels).—Haulm fairly strong, erect, dark green. Tubers large, flat kidney, eyes shallow, eyebrows pronounced, skin smooth. Crop good, not diseased.

36. The Winder's Pride (Watson).—This variety originated as the result of a cross between 'Eclipse' ♀ and 'Patterson's Victoria' ♂. Haulm strong and erect, light green. Tubers of good size, flat kidney, eyes very shallow, eyebrows indistinct. Crop good and free from disease.

22. Tuns (Heinemann).—Haulm light green, fairly strong and of spreading habit. Tubers of varying size, flat kidney, eyes deep, eyebrows prominent, skin smooth. Crop moderate and free from disease.

14. Western Hero (R. Veitch), **XXX** July 21, 1913.—Haulm fairly strong, light green, and of spreading habit. Tubers of good even size, kidney, eyes shallow, eyebrows fairly distinct, skin russet. Crop good, no disease.

23. Windsor Castle (Dobbie), **F.C.C.** September 12, 1893.—See vol. xxxvii. p. 572.

Mid-Season and Late Varieties.

60. Aristocrat (King).—Haulm purple, weak, erect, foliage dark green. Tubers of medium size, round kidney, eyes shallow, eyebrows fairly well defined, skin smooth and deep purple in colour. Crop good and free from disease.

40. Arran Chief (Daniels).—See vol. xxxvii. p. 574.

61. Bonnie Dundee (Staward).—See vol. xxxviii. p. 568. Crop good, not diseased ; tubers of good size.

26. Cigarette (Barr), **A.M.** November 21, 1905.—See vol. xxxviii. p. 568.

31. Conquest (Dobbie), **XXX** September 10, 1912.—See vol. xxxviii. p. 568.

47. Defiance (Barr).—Haulm strong, light green, spreading. Tubers of good size, round kidney, eyes shallow, eyebrows indistinct, skin russet. Crop good, diseased.

50. Defiance (Sands).—Similar to No. 47. Crop heavy, slightly diseased.

62. Devon Champion (Adams).—Haulm fairly strong, dark green, erect. Tubers of good size, round, eyes deep, eyebrows sharply defined, skin russet. Crop good and free from disease.

34. Dobbie's Favourite (Dobbie), **F.C.C.** December 31, 1907.—See vol. xxxviii. p. 569. Crop heavy and free from disease.

48. Duchess of Cornwall (R. Veitch), **A.M.** October 24, 1905.—Haulm strong and erect, dark green. Tubers of good size, flat round, eyes shallow, eyebrows indistinct, skin clear and smooth. Crop heavy, not diseased.

55. Gold Finder (Carter).—Haulm strong and spreading, dark green. Tubers of medium size, long flat kidney, eyes shallow, eyebrows not distinct, skin russet. Crop very heavy, diseased.

30. Great Scot (R. Veitch), **A.M.** September 26, 1911.—See vol. xxxviii. p. 269. Crop good and free from disease.

51. His Majesty (Fletcher).—Haulm dark green, weak, spreading. Tubers of varying size, flat kidney, eyes shallow, eyebrows pronounced, skin clear. Crop moderate and free from disease.

49. International Gem (Sands).—See vol. xxxviii. p. 569.

56. Invicta (Carter).—Haulm light green, weak, spreading. Tubers of medium size, round kidney, eyes very shallow, eyebrows fairly distinct, skin russet, deep purple. Crop good, not diseased.

54. King of the Russets (Carter), **F.C.C.** March 30, 1886.—Haulm strong, erect, dark green. Tubers of good even size, round, eyes shallow, eyebrows fairly distinct, skin reddish purple, smooth. Crop good and free from disease.

37. Lounnersom Abundance (Heinemann).—Haulm strong and erect in growth, dark green. Tubers large, round, eyes fairly deep, eyebrows prominent, skin clear and smooth. Crop good, very slightly diseased.

44. Mayflower (Sands).—Haulm dark green, strong and erect.

Tubers of medium size, flat round, eyes shallow, eyebrows sharply defined. Crop good, badly diseased.

25. Morna (Kime).—Haulm strong and erect in growth, dark green. Tubers mostly small, kidney, eyes shallow, eyebrows fairly prominent, skin smooth. Crop fairly good, free from disease.

53. No. 20 (Carter).—Haulm spreading, rather weak, stems purplish, leaves dark green. Tubers medium, long flat kidney, eyes very shallow, eyebrows fairly distinct. skin reddish purple, smooth. Crop good and free from disease.

38. Norfolk Beauty (Daniels).—See vol. xxxviii. p. 570.

42. Pride of Lincolnshire (Sharpe).—Haulm strong, erect, light green. Tubers small, kidney, eyes shallow, eyebrows pronounced, skin russet. Crop fair and not diseased.

52. Queen Mary (Fletcher).—Haulm rather weak, spreading, light green. Tubers of varying size, flat kidney, eyes very shallow, eyebrows scarcely perceptible, skin clear. Crop light, free from disease.

41. Raynes Park White (Carter), **XXX** August 22, 1913.—Haulm fairly strong and of erect growth, dark green. Tubers of good size, flat kidney, eyes shallow, eyebrows distinct, skin russet. Crop heavy and free from disease.

57. Snowball (Carter).—Haulm fairly erect, strong, light green. Tubers of good size, round, eyes deep, eyebrows well defined, skin russet. Crop good, free from disease.

58. Southern Star (J. Veitch), **A.M.** November 21, 1905.—Haulm strong, spreading, light green. Tubers of good size, flat kidney, eyes very shallow, eyebrows indistinct. Crop heavy and free from disease.

65. The Admiral (Dobbie).—Haulm strong, erect, light green. Tubers of good size, round, eyes deep, eyebrows well defined. Crop good, slightly diseased.

64. The Chapman (Dobbie).—Haulm strong and of somewhat spreading habit, light green. Tubers of medium size, flat round, eyes shallow, eyebrows fairly well defined. Crop very good, but somewhat diseased.

45. The Colleen (Sydenham), **A.M.** August 9, 1907.—Haulm very strong, dark green, erect. Tubers of good size, flat kidney, eyes shallow, eyebrows well defined, skin russet. Crop good, slightly diseased.

63. The Cottar (Dobbie).—Haulm strong and spreading, light green. Tubers of medium size, round kidney, eyes shallow, eyebrows distinct. Crop good, but somewhat diseased.

43. The Diamond (Barr), **A.M.** September 10, 1912.—See vol. xxxviii. p. 570.

46. The Factor (Barr), **F.C.C.** April 25, 1905.—See vol. xxxviii. p. 570.

59. Vitality (J. Veitch).—Haulm spreading, dark green. Tubers of good size, round, eyes shallow, eyebrows fairly well defined. Crop good and practically free from disease.

TURNIPS AT WISLEY, 1913.

SEVENTY-THREE stocks of turnips were received for trial. The first sowing was made on May 28, and another a month later; all the stocks germinated well, and, in spite of drought, all made excellent growth. It may be of interest to note that those sown in the second sowing were much better on ground that had not been deeply dug, but merely hoed over, then raked, the drills drawn and the seeds sown at the same time, than those on deeply-dug, recently-manured soil; showing that it is not necessary, in fact better not, to dig the ground after peas or other early crops, if turnips are to follow. Not only were the turnips earlier, but the bulbs were more shapely and kept in good condition long.

The garden Swede is now of such a nice size that we recommend all those who have not tried it for winter use to give it a trial, as it makes such an excellent change when vegetables are scarce, especially in severe winters.

LIST OF VARIETIES.

*1. All the Year Round.
2. American Strapleaf (red).
3. All the Year Round.
4. Covent Garden Snowball.
5. Chirk Castle Blackstone.
6. Champigny (half long, red).
7. Criterion.
8. Danish Bortfelder.
9. Early Frame.
10. Garden Swede.
11. Eclipse.
12. Early Flat Scarlet.
13. Flat Red.
14. Flat Yellow (scarlet striped).
15. Laing's Garden Swede.
16. Golden Ball.
17. Green Top White.
18. Golden Ball (selected).
19. Green Top Stone.
20. Golden Nugget.
21. Golden Ball.
22. Hybrid (new).
23. Milan, Extra Early White.
24. Milan, Extra Early.
25. Milan, Early.
26. Milan, Early White.
27. Milan, Extra Early.
28. Milan, Early Red.
29. Milan, Early White.
30. Milan, White.
31. Milan, White.
32. Milan, Red Top Early.
33. Maltese, Yellow.
34. Jersey, White Round.
35. Jersey Navet.
36. Jersey Lily.
37. Long Forcing, Early.
38. Little Marvel.
39. Long Yellow.
40. Long White.
41. Model White (selected).
42. Matchless.

* See footnote, p. 636.

43. Model White Stone.
44. Munich Purple Top (extra early).
45. Manchester Market Green Top (white).
46. Manchester Market Green Top (yellow).
47. Manchester Market.
48. Purple Top Milan.
49. Paris Market.
50. Petrowski.
51. Red Globe.
52. Red Globe.
53. Red Globe (early strapleaf).
54. Red Globe.
55. Red Top Stone.
56. Six Weeks, Early.
57. Snowball, Early.
58. Snowball.
59. Snowball, Early.
60. Scarlet Perfection.
61. Six Weeks (selected).
62. The Cardinal.
63. Taylor's Cream.
64. Orange Jelly.
65. White Forcing (half long).
66. White Garden Swede (new).
67. White Garden Swede (new).
68. White Gem (early half long stump rooted).
69. White Model, Early.
70. White Globular, Early.
71. Yellow Garden Swede (new).
72. Yellow Garden Swede.
73. Yellow Six Weeks.

A.M. = Award of Merit.
XXX = Highly Commended.

1. All the Year Round (Carter), **XXX** July 27, 1913.—Globe type; leaves long, broad, dark green; root medium size, yellow, flesh creamy white; roots fairly long, tapering below. Ready July 14.

3. All the Year Round (Sutton).—Globe type; leaves long, broad, dark green; root fairly large, white, flesh white; roots long and tapering below. Ready July 14.

2. American Strapleaf Red (Carter).—Milan type; leaves strap shape, dark green; root medium size, white, purple top, flesh white; roots thin, short. Ready July 7.

6. Champigny (Half Long, Red) (J. Veitch).—Jersey Navet type; leaves large, broad; root fairly large, white, purple top, flesh white; roots thick, short. Ready July 7.

5. Chirk Castle Blackstone (Barr).—Globe type; leaves broad, short, dark green; root fairly large, greyish white, flesh white; roots short, thick. Ready July 14.

4. Covent Garden Snowball (Barr), **XXX** July 21, 1913.—Globe type; leaves large, broad; root medium size, white, flesh white; roots short, thick. Ready July 14.

7. Criterion (Sutton), **XXX** July 21, 1913.—Globe type; leaves strap shape, large; root medium size, white, purple top, flesh white; roots short, thick. Ready July 14.

8. Danish Bortfelder (L. Daehnfeldt).—Carrot-rooted type; leaves large, broad; root large, long, tapering, white, flesh creamy white. Ready July 7.

12. Early Flat Scarlet (Breadmore).—Milan type; leaves medium size, broad, very dark green; root large, purple, flesh white, short.

9. Early Frame (Sharpe).—Jersey Navet type; leaves short, broad; root rather irregular, white, flesh white; roots short. Ready July 7.

11. Eclipse (Gray).—Globe type; leaves long, broad; root fairly large, white, flesh white; roots short. Ready July 14.

13. Flat Red (Barr).—Milan type; leaves short, broad, dark green; root fair size, purple, flesh white; roots thin and tapering. Ready July 7.

14. Flat Yellow, Scarlet Striped (Breadmore).—Milan type; leaves short, broad; root medium size, white, flesh creamy white; roots long, slender. Ready July 7.

10. Garden Swede (Dobbie).—Leaves lyrate, glaucous, 18 inches long; petiole stout; root conical, small, pale green top, flesh white; long, tapering root.

15. Garden Swede (Laing's) (R. Veitch).—Leaves lyrate, medium size; root small, conical, white, flesh white; roots short.

16. Golden Ball (Sutton).—Globe type; leaves long, broad; root fairly large, yellow, flesh creamy white; roots long, tapering. Ready July 14.

18. Golden Ball selected (Sharpe).—Globe type; leaves large, broad; root medium size, yellow, flesh white; roots short, slender. Ready July 14.

21. Golden Ball (Dobbie).—See No. 16. Ready July 14.

20. Golden Nugget (Barr).—Globe type; leaves short, broad, scanty; root small, golden yellow, flesh cream; roots short, slender. Ready July 14.

19. Green Top Stone (Nutting).—Globe type; leaves large; root large, white, flesh white; roots long, thin. Ready July 14.

17. Green Top White (Sutton).—Globe type; leaves long, broad; root large, green top, white, flesh white; roots thick, short. Ready July 14.

22. Hybrid New (Dobbie).—Globe type; leaves long, broad; root medium size, purple, flesh white; roots coarse. Ready July 14.

36. Jersey Lily (Carter).—Globe type; leaves long, very broad; root large, white, flesh white; roots coarse. Ready July 14.

35. Jersey Navet (Barr), **A.M.** May 8, 1900 (as a forcing variety).—Leaves long, narrow; root medium size, white, flesh white; roots short, thick. Ready July 7.

34. Jersey, White, Round (Heinemann).—Globe type; leaves long and broad; root medium size, white, flesh white; roots fairly long, thick. Ready July 14.

38. Little Marvel (Carter).—Milan type; leaves large; root large, white, flesh white; roots short, thick. Ready July 7.

37. Long Forcing, Early (Carter).—Jersey Navet type; leaves long, broad; root good size, white, flesh white; roots short, thin. Ready July 7.

40. Long White (Breadmore).—Jersey Navet type; leaves long and large, root rather large, white, flesh white; roots short, thin. Ready July 7.

39. Long Yellow (Breadmore).—Carrot-rooted type; leaves long, broad; root long, tapering, yellow, flesh white. Ready July 7.

47. Manchester Market (Sharpe), **XXX** July 21, 1913.—Globe type; leaves large; root fairly large, white, flesh white; roots long, rather thick. Ready July 14.

45. Manchester Market Green Top (white) (Dickson & Robinson).—Globe type; leaves very large; root of medium size, white, flesh white; roots short, thick. Ready July 14.

46. Manchester Market Green Top (yellow) (Dickson & Robinson).—Globe type; leaves very large; root of medium size, yellow, flesh white; roots short, thick. Ready July 14.

42. Matchless (Sutton).—Globe type; leaves very large; root medium size, white, flesh white; roots long and tapering. Ready July 14.

23. Milan, Extra Early White (R. Veitch).—Leaves strap shape; root fairly large, white, flesh white; roots long, slender. Ready July 7.

24. Milan, Extra Early (R. Veitch), **A.M.** June 12, 1883.—Leaves strap shape, rather large; root medium size, purple top, white, flesh white; roots very long and thin. Ready July 7.

25. Milan, Early (Dobbie).—Leaves strap shape, large; root medium size, purple, flesh white; shoots fairly long, thin. Ready July 7.

26. Milan, Early White (J. Veitch).—Leaves strap shape, fairly large; root medium size, white, flesh white; roots short, thin. Ready July 7.

27. Milan, Extra Early (J. Veitch), **A.M.** June 27, 1883.—Leaves strap shape, small; root fairly large, white, purple top, flesh white; roots short, thin. Ready July 7.

28. Milan, Early Red (Sutton).—Leaves strap shape; root rather large, white, purple top, flesh white; roots short, very thin. Ready July 7.

29. Milan, Early White (Sutton).—Leaves strap shape, large; root medium size, white, flesh white; roots short, thin. Ready July 7.

30. Milan, White (Nutting).—Leaves strap shape, large; root large, white, flesh white; roots short, thick. Ready July 7.

31. Milan, White (Carter), **XXX** July 21, 1913.—Leaves strap shape, medium size; root medium size, white, flesh white; roots long, thin. Ready July 7.

32. Milan Red Top Early (Carter), **XXX** July 21, 1913.—Leaves strap shape, broad; root fairly large, white, purple top, flesh white; roots short, thin. Ready July 7.

33. Maltese Yellow (Carter).—Milan type; leaves large, not strap shape; root medium size, yellow, flesh creamy white; roots short, stout. Ready July 7.

41. Model White selected (Dobbie), **A.M.** October 26, 1897.—Globe type; leaves very large; root fairly large, white, flesh white; roots short, slender. Ready July 14.

43. Model White Stone (Sydenham), **XXX** July 21, 1913.—Globe

type ; leaves long, broad ; root medium size, very regular, white, flesh white ; roots fairly long, slender. Ready July 14.

44. Munich Purple Top (extra early) (Barr).—Milan type ; leaves long, broad ; root rather large, white, purple top, flesh white ; roots fairly short, thin. Ready July 7.

64. Orange Jelly (Barr).—Globe type ; leaves large ; root small, yellow, flesh creamy white ; roots long, tapering. Ready July 14.

49. Paris Market (J. Veitch).—Jersey Navet type ; leaves large ; root medium size, white, flesh white ; roots long, tapering. Ready July 7.

50. Petrowski (R. Veitch).—Milan type ; leaves scanty, long, broad ; root medium size, white, flesh white ; roots short, thin. Ready July 7.

48. Purple Top Milan (Nutting).—Leaves strap shape ; root rather large, white, purple top, flesh white. Ready July 7.

51. Red Globe (R. Veitch).—Globe type ; leaves very large ; root small, purple, flesh white ; roots fairly long, stout. Ready July 14.

52. Red Globe (J. Veitch).—See No. 51.

53. Red Globe, Early Strap-leaved (J. Veitch), **XXX** July 21, 1913. —Globe type ; leaves strap shape, large ; root large, white, purple top, flesh white ; roots long, tapering. Ready July 14.

54. Red Globe (Sutton).—Globe type ; leaves large ; root large, white, purple top, flesh white ; roots short, thick. Ready July 14.

55. Red Top Stone (Carter).—Globe type ; leaves large, dark green ; medium size root, purple top, flesh white ; roots long, thick. Ready July 14.

60. Scarlet Perfection (J. Veitch).—Milan type ; leaves large ; roots small, blood red, flesh white ; roots short, thin. Ready July 7.

56. Six Weeks, Early (Sutton).—Globe type ; leaves large ; root small, white, flesh white ; roots long, slender. Ready July 14.

61. Six Weeks, selected (Sharpe).—Globe type ; leaves medium size ; root fairly large, white, flesh white ; roots short, thin. Ready July 14.

73. Six Weeks, Yellow (Sutton).—Milan type ; leaves large ; root small, yellow, flesh creamy white ; roots long, slender. Ready July 7.

58. Snowball (Nutting).—Globe type ; leaves large ; root small, white, flesh white ; roots long, slender. Ready July 14.

57. Snowball, Early (Sutton), **A.M.** July 21, 1913.—Globe type ; leaves large ; root fairly large, white, flesh white ; roots medium length, thick. Ready July 14.

59. Snowball, Early (R. Veitch).—See No. 58.

63. Taylor's Cream (Taylor).—Globe type ; leaves large ; root large, white, flesh white ; roots short, rather thick. Ready July 14.

62. The Cardinal (R. Veitch).—Milan type ; leaves large ; root medium size, purple, flesh white ; roots short, thin. Ready July 7.

65. White Forcing, Half Long (Heinemann). — Jersey Navet type ; leaves long, broad ; root medium size, white, flesh white ; roots fairly long and thick. Ready July 7.

66. White Garden Swede (new) (J. Veitch).—Leaves lyrate, large, glaucous ; petiole slender ; root ovate, abruptly pointed, light green top, medium size, flesh white ; roots short.

67. White Garden Swede (new) (Sharpe).—Leaves lyrate, narrow, short ; petioles slender ; root ovate, abruptly pointed, white, medium size, flesh white ; roots short.

68. White Gem (Nutting).—Globe type ; leaves long, narrow ; root fairly small, white, flesh white ; roots long, tapering. Ready July 14.

69. White Model, Early (Barr).—Globe type ; leaves large ; root medium size, white, flesh white ; roots short, thin. Ready July 14.

70. White Globular, Early (Breadmore).—Globe type ; leaves large ; root large, white, flesh white ; roots fairly long, thick. Ready July 14.

71. Yellow Garden Swede (new) (Sharpe).—Leaves narrow, short ; petioles slender ; root small, yellow, oval, flesh pale orange.

72. Yellow Garden Swede (new) (J. Veitch).—Leaves narrow, short ; petioles slender ; root medium size, oval, green top, flesh cream ; roots short.

MISCELLANEOUS VEGETABLES AT WISLEY, 1913.

Broad Bean.

Aquadulce (R. Veitch).—A medium grower ; prolific bearer ; pods large, filled with large seeds.

Beck's Dwarf Green Gem (R. Veitch).—A very dwarf stock ; crop poor.

Seville Longpod (R. Veitch), **F.C.C.** July 10, 1874.—A good cropping variety, of average height, bearing large, straight pods.

Brussels Sprouts.

Darlington (R. Veitch).—An excellent variety, of dwarf and compact growth, with medium foliage and large, firm sprouts.

Dwarf (Dickson & Robinson).—A good dwarf variety, producing excellent, firm sprouts.

Exhibition (Dickson & Robinson).—A good variety, producing a nice crop of sprouts of medium size and very firm.

Ideal (R. Veitch).—A dwarf variety, producing good-sized, firm sprouts.

Cabbage.

Early Jersey Wakefield (R. Veitch).—An excellent variety, producing medium-sized hearts of regular conical shape and of good quality. They are very firm and do not come coarse. The plant is compact in habit, and the stock quite pure.

Veitch's Dark Selected (R. Veitch).—A red pickling variety, of compact habit, producing medium-sized round hearts of good quality and great firmness.

Capsicum.

Giant of Tripoli (Dammann).—A tall grower, bearing large scarlet fruits.

Lampion (Dammann).—A dwarf variety, with small foliage and very distinct red fruits. It is a very free bearer.

Marconi (Dammann).—A strong grower, bearing large, smooth obovate-shaped fruits of a bright red colour.

Cauliflower.

Early Dwarf Erfurt (Dickson & Robinson).—A useful variety, forming nice, firm, white and somewhat flat heads of medium size. It comes into use early, and is dwarf in habit.

Extra Early Forcing (Dickson & Robinson), **F.C.C.** June 28, 1881.—A very early cauliflower, of compact habit, forming nice, firm, white heads, of good size and self-protecting.

Drain Court (Barr).—An excellent variety, coming into use just before 'Autumn Giant.' The heads are of medium size and good quality, white, compact, and self-protecting.

Midsummer Day (R. Veitch).—Early Snowball type; foliage slightly glaucous; habit sturdy, rather flat, firm, creamy white, well protected with long, dark-green outer leaves. Habit very compact.

Standwell (Dickson & Robinson).—A large and very useful variety, producing very firm white heads, protected by large leaves. It is compact in habit, and comes into use early in the season.

French Bean.

Early Favourite (R. Veitch), **A.M.** April 27, 1897.—Growth vigorous; foliage dark green; leaflets blunt; flowers pale lilac; pods light green, 6 inches long, slightly curved. Plants 18 inches high. Crop very heavy.

Longsword (Carter).—Growth vigorous; foliage dark green; leaflets small, pointed; flowers yellowish white; pods light green, 6 inches long, straight. Crop good. Height of plant 18 inches.

Magpie (Carter).—This variety did not germinate so well as others grown with it. Foliage dark green; pods pale green, 7 inches long, straight. Crop good. Height of plant 14 inches.

Perpetual (Carter), **A.M.** July 29, 1913.—An excellent variety. Growth moderate; foliage dark green; leaflets small, blunt; flowers light lilac; pods pale green, 6 inches long, straight. Crop very heavy. Height of plant 1 foot.

Sunrise (Carter), **A.M.** July 29, 1913.—Another excellent variety, producing very heavy crops of pale green straight beans, 5½ inches long. Height of plant 15 inches.

White Model (Carter).—Pods light green, 6 inches long, slightly curved. Crop fair. Height of plant 16 inches.

Leek.

Renton's Monarch (R. Veitch).—A good leek, making fine, stout stems, which blanch readily and are of good length; leaves long, broad, and strap-shaped.

Lettuce.

Duke of Cornwall (R. Veitch), **A.M.** July 5, 1901.—A fine cabbage lettuce, with very broad, crinkled leaves, and firm, solid hearts.

Fillbasket (R. Veitch).—Another cabbage variety, having broad, smooth leaves. It fails to heart well and rapidly runs to seed, and is rather spreading in habit.

Radish.

Ever Tender (R. Veitch).—An excellent red globular radish, with white tip. It is of medium size, and has a mild flavour.

BOOK REVIEWS.

"Elementary Tropical Agriculture." By W. H. Johnson, F.L.S. xi + 150 pp.; illustrations in the text. (Crosby Lockwood, London, 1913.) 3*s.* 6*d.* net.

This book has been prepared primarily for use in West African schools. The author is Director of Agriculture in Southern Nigeria, and formerly held a similar post on the Gold Coast and in Portuguese East Africa. It may be assumed, therefore, that he has an intimate acquaintance with local requirements and has adapted his book to local needs. Only the very elementary facts are stated, and these are written in clear, non-technical language, and are followed by descriptions of simple experiments to demonstrate the lessons.

The unhealthy climatic conditions that obtain in West Africa render the agricultural development of that vast area by Europeans impossible; hence the importance of training West African youths in the principles of agriculture as part of their elementary education, so that in the future a more progressive policy may be adopted in regard to this most important of all native industries.

The two parts into which the book is divided deal respectively with the soil and plant life, and the school garden; a chapter on plant diseases and one on insect pests is included in the first part. The line drawings by Mr. A. D. Peacock, B.Sc., which illustrate the text, are well executed and add much to the value of the book.

"Alpine Plants of Europe, together with Cultural Hints." By Harold Stuart Thompson, F.L.S. 8vo., 287 pp. (Routledge, London, 1911.) 7*s.* 6*d.* net.

For long there has been need for a well-illustrated book in the English language descriptive of the flowering plants of the whole range of the European Alps. Mr. H. Stuart Thompson is to be congratulated on having produced, very successfully, such a work. His "Alpine Plants of Europe" is a book which flower lovers and growers of alpine plants will do well to take with them on their alpine holidays, for with the aid of the beautiful coloured plates taken from Joseph Seboth's drawings, and Mr. Stuart Thompson's careful descriptions, there should seldom be much difficulty in identifying the plants met with on such a holiday. Some 700 species are described, mostly perennials, and these 700 have been chosen more for their decorative value and general interest to the tourist and gardener than for purely botanical interest. A few Southern rock plants—such, for instance, as *Morisia hypogaea*, from Corsica and Sardinia, which,

though not alpine, are yet particularly suitable for cultivation in rock gardens—have been included. Although Mr. Stuart Thompson is a botanist, and his descriptions are botanical descriptions, he is also a gardener and a flower lover, and he has added to his botanical descriptions notes on the garden value of many of the species, cultural hints, and such other general information as his wide knowledge of the Alps and of alpine plants has suggested. Such notes add vastly to the value and interest of the book. It is all very well, and of course quite essential, to be told of *Ononis cenisia* that the "calyx lobes are scarcely longer than the tube. Pod 10·12 mm. by 6 mm., at least twice the length of the calyx; pubescent, glandular." But it is delightful to be told also that "at Mont Cenis it grows on the plateau behind the Hospice, and appears very local in the immediate district. . . . This beautiful little Rest-harrow should be introduced into English rock gardens, for it is the best of the dwarf species and strictly Alpine. It should be planted in poor but deep, well drained, stony soil, in full sun." Part I. deals with Alpine Plants in their Native Haunts; the Cultivation of Alpine Plants; and Collecting and Pressing Alpine Flowers.

Although "Alpine Plants of Europe" would be of little use to the serious botanist working on the alpine flora of Europe as a whole, it is exactly the book which the gardener-tourist has long needed, and from that standpoint it is excellent. After the surfeit of chatty, facetious, and often misleading books that have been written round the subject of alpine plants during the last few years, Mr. Stuart Thompson's careful and authoritative piece of work is doubly welcome.

"Beautiful Roses for Garden and Greenhouse." By John Weathers. 8vo., 152 pp. With coloured plates by John Allen. (Simpkin, Marshall, London, 1913.) 1*s.* 6*d.* net.

This little book of some 150 pages is a reprint of that published about ten years ago, so far as we have been able to compare the reprint with the original volume, without alteration.

The result is that the varieties recommended are in some cases rather out of date; for instance, of the 82 Hybrid Perpetuals selected it is doubtful whether more than thirty or so are now much grown in our gardens, and in the treatment of fungoid diseases there is no mention of the sprays and washes now generally in use. In fact the only sprays we have noticed in the book are quassia and tobacco extract for insect pests (both still excellent, but improved by an admixture with soft soap), and for fungoid disease spraying with potassium sulphide, which is to be used at the rate of 1 oz. of the sulphide to 2½ gallons of water, a proportion now generally considered by rosarians to be rather too strong, particularly where the foliage is young, and it is thought far safer to employ 1 oz. to 10 gallons for early work and 1 oz. to 5 gallons later in the year.

There is, however, much to be said in favour of this little book,

and we are by no means sorry to have had the opportunity of reading it afresh. It is well printed and nicely got up, and, like nearly all Mr. Weathers' work, the writing is careful, accurate, and to the point. In a book of this kind it is a real pleasure to come across an author who attends strictly to business, and resists the temptation to indulge in the enthusiastic discursiveness which spoils so many of our modern gardening books. The general principles of rose culture have altered little in the ten years that have elapsed since this book was first printed, and the directions given by the author are in most cases as valuable now as they were then.

The book contains a number of coloured plates of roses which to our taste appear rather hard in outline, and, in some cases, not very typical either of the colour or form of the flowers represented. The best pictures are those of the single roses, some of which are quite good and might be excepted from the above criticism.

One-third of the book (about 50 pages) is devoted to descriptions of the different varieties of roses grown in gardens, while the remainder deals with cultural directions, exhibiting roses, and selections of roses for particular purposes.

"The British Rust Fungi (Uredinales): their Biology and Classification." By W. B. Grove, M.A. 8vo. xii + 412 pp. (University Press, Cambridge, 1913.) 14*s*. net.

Twenty-four years have passed since the late Dr. C. B. Plowright published his notable monograph on the British Uredineae and Ustilagineae, and the time is ripe for a new one. Plowright's book has long been out of print, and much work has been done with this group of fungi in the meanwhile. Eriksson's mycoplasm theory has been brought forward and refuted; Klebahn's excellent work "Die Wirtswechselnden Rostpilze," appeared in 1904; the Sydows' "Monographia Uredinarum" is in course of publication; smaller papers almost without end have appeared dealing with life-histories and distribution; while exploration has not been without its reward in this country. In spite of the fact that these fungi are, without exception, parasites, and some of them answerable for serious economic loss in all parts of the world, the discovery of a "new species" for the country's list gives an exciting thrill which only the true naturalist can know, and this thrill still awaits some in our own country. Life-histories of some of our species are still to be discovered, and much interesting and valuable work remains to be done. The author has gathered together the fruits of the labours of others in this volume, and has added to them the results of his own researches, so that he has produced a book valuable alike to the expert and to the amateur who makes a study of this enticing group of fungi. He has brought the nomenclature into line with modern ideas (and incidentally sunk some of the well-known names, such as *Puccinia suaveolens* and *Phragmidium subcorticium*), and has redescribed a large number of species from British specimens, at the same time giving drawings of

the spores, while the notes following the description of each species add greatly to the value of the book.

A complete fungus flora of Britain, such as exists, e.g., for Germany, is greatly to be desired, and if it were done in the same complete and capable fashion as the present section it would be of immense service to all mycologists and, through them, to the general public. The book is well printed on good paper, and altogether one we can warmly commend to everyone whose work or pleasure lies in the study of the Uredinales.

"Garden Trees and Shrubs. Illustrated in Colour." By W. P. Wright. 8vo., 337 pp. (Headley, London, 1913.) 12*s*. 6*d*. net.

This is a sumptuous work of some three hundred and thirty pages —well written, nicely got up, and beautifully illustrated. The list of new trees and shrubs is particularly valuable, and already many of the introductions from China have been found well suited for cultivation in this country, and apparently quite hardy. We could have wished that the list of trees and shrubs had been extended, as it is difficult in the small space allotted to such genera as *Pyrus* and *Berberis* to do them the justice they deserve in the matter of description and cultivation.

Some excellent advice is given in chapter vii. on "Mistakes in the Culture of Trees and Shrubs," advice that we would like to see carried out in a greatly extended fashion in the formation of woodlands and shrubberies. Imperfectly prepared soil, careless planting, and want of attention to the individual requirements of trees and shrubs are all evils to be guarded against. In some of the chapters, such as those on seaside and town planting, several of the most valuable species have escaped notice, but in such a comprehensive work omissions of this kind may purposely occur. We are glad to see that a chapter is devoted to pruning shrubs and trees, for this operation is but little understood, as is also the proper time at which pruning should take place. Different trees and shrubs have widely different habits of growth, and so it behoves us to study well these peculiarities before the pruning-knife is applied. In the matter of hedges the author gives sound advice; while the list of shrubs for planting in the shade is extensive, and supplemented for the first time by that useful Chinese shrub *Sarcococca ruscifolia*. Altogether the book is most useful, and may equally well grace the library of the gardener or the drawing-room table.

Regarding the illustrations we cannot speak too highly, and the author is certainly to be congratulated on getting together so meritorious a work.

"Mildews, Rusts, and Smuts." By G. Massee and Ivy Massee. 8vo., 229 pp. 5 plates. (Dulau, London, 1913.) 7*s*. 6*d*. net.

It is long since a book containing descriptions of all the fungi contained here and native in Britain has been published. The last

was that of Dr. Cooke, with a very similar title. In the meanwhile Plowright's *Uredineae and Ustilagineae* appeared about twenty years ago, and Salmon's excellent monograph of the mildews more recently still, while Massee's *British Fungi* contained descriptions of the "false mildews" and smuts. The first and last are out of print and out of date, while the other was published in America and is perhaps not easily obtained. It was a happy thought of the authors to bring together the descriptions of these fungi, for they are without exception parasites, many of them of great importance, and it was also a happy thought to include descriptions of allied species which are known to attack plants much cultivated or wild in Britain, but which have not yet reached these shores, or at least have not made their presence felt. In this, not being a book dealing with the economic aspect of the fungus attacks to any extent, the question of appropriate remedies is not touched upon.

The book is clearly printed on nice paper, not too heavy for comfortable use, and will be of great assistance to those who are attracted to the microscopic study of the minute parasites that are so abundant, both on cultivated and wild plants.

It is to be hoped that, ere long, someone with the necessary knowledge, and with time to gather together and arrange his material, will give us descriptions in English of the minute fungi of other groups than those dealt with in these pages, and so assist and stimulate the study of forms very much neglected in this country at the present day. No such task has been attempted here for half a century, while Germany and other countries have capital fungus floras.

We have nothing but praise for the general plan and arrangement of the book, but when we come to look into the details we feel that some criticism is called for. It is very difficult to avoid all errors in spelling of botanical names, but surely it might have been possible to avoid some of the errors in the book under review—they are so very numerous. Opening the book at random we find, e.g., p. 99, epidermic for epidemic, *Puccinia cichoria* for *P. Cichorii*, consticted for constricted; p. 100, *Cichoria* for *Cichorium*, *Caeoma seoavlens* for *Caeoma suaveolens*, *Cirsium arvensis* for *C. arvense*. It may be remarked, too, that the authors have entirely ignored the rules of capitalization as agreed at the Botanical Congress of Vienna, by omitting capitals from specific names altogether. Another curious thing which comes to light on a closer inspection of the book is the number of omissions. One *Uromyces*, for instance, described in the first place by one of the authors, is not even mentioned—*U. Colchici*—and several other species are overlooked entirely. In the same way, in many cases the lists of hosts are curiously incomplete. *Ustilago violacea*, for instance, is, in addition to the long list of hosts mentioned, not infrequent on the carnation, spoiling the appearance of the flowers by its violet spores; while, besides attacking *Scilla bifolia* and *Gagea lutea*, Chionodoxas often fall victims to *U. Vaillantii*. One genus of rusts is omitted entirely. The distribution of most of the

fungi mentioned is given, but it is omitted in the case of a number of the smuts.

One might easily find much to criticize in the nomenclature adopted, but we will not let this detain us. We must, however, point out that of the "form genera" included on pp. 167–169, *Aecidium Phillyreae* has been connected with the curious *Zaghouania Phillyreae*, *A. Glaucis* with *Uromyces Scirpi* (see JOURNAL R.H.S. xx. p. cix), *A. Euphorbiae* with *Uromyces tuberculatus*, *Uredo Agrimoniae* with *Pucciniastrum Agrimoniae*, *Uredo Symphyti* with *Melampsorella Symphyti*, *Uredo Mülleri* with *Kuehneola albida*, *Uredo Quercus* Brond. (not Brand. as printed) with *Cronartium Quercuum*, while some of those fungi given as not yet found in Great Britain have already been placed on record as British, e.g. *Puccinia Leucanthemi* on the ox-eye daisy. We find other odd statements here and there, as on p. 162, where we read "*Trollius europaeus* is not a British plant, but is commonly cultivated."

It is with great regret that we allude to a few of the many points which a little more care and research on the part of the authors might have made more perfect, for the book is of real value, and might have been of so much greater value if this extra trouble had been expended—and really the trouble would have been little when we remember the splendid library and herbarium to which the authors have such ready access.

"Wild Flowers, and How to Name them at a Glance without Botany." By Col. J. S. F. Mackenzie. 8vo., 224 pp. (Holden & Hardingham, London, 1913.) 1*s*.

The author sets out to help the ignorant to name the commonest wild flowers by means of descriptions arranged according to flower colour and shape, stem and leaf form. Anyone who cannot identify the plants by the aid of this little book must be dense indeed, and we hope its use will spur inquirers on to find out more of these beautiful "common objects" of the countryside.

"Botany." By E. Brucker. 8vo., xv + 185 pp. (Constable, London, 1913.) 2*s*. net.

There are several series of books in course of publication aiming to cover more or less completely all the area of human knowledge. The present volume forms one of the series called the "Thresholds of Science." The avowed aim of the series is "to meet . . . the need of the man who would teach himself the elements of science, and the need of the child who shows himself every day eager to have them taught to him." This little book will fulfil the aim to a great extent so far as the elements of botany go, in the case of the man, probably without the aid of a teacher; for the child, with his aid. It is simple and accurate, and although written by a Frenchman (the whole series appears to be by foreign authors), the examples chosen are well known in Great Britain.

"A Survey of the Soils and Agriculture of Shropshire." By G. W. Robinson, B.A. 8vo., 98 pp. (Walker, Shrewsbury, 1913.) 1*s.* paper.

This is a really valuable collection of facts concerning the soils of Shropshire, and we congratulate the Higher Education Committee of the County of Salop on the clear-sighted policy they have adopted in arranging for the prosecution of the investigation and its publication in this convenient form. Similar information has recently been published by the Board of Agriculture regarding Kent, Surrey, and Sussex, and we hope that ere long we may see the whole of England surveyed in the same way. It is now over twelve years since the present writer suggested a similar survey to one of our larger county education committees (but without success then), for the progress of both agriculture and commercial horticulture depends very largely upon the choice of suitable soils for the growth of particular crops. This choice must be governed by several considerations, but the physical structure of the soil is, perhaps, most important, and it is with this, and the correlation between it and the crops grown, that the present little book deals. It is an admirable piece of work, and we commend it to the careful study of all practical commercial gardeners.

"The Chemistry of Plant and Animal Life." By H. Snyder, B.S. Ed. 3. 8vo., xxii + 388 pp. (Macmillan, New York, 1913.) 6*s.* 6*d.* net.

A series of lessons with experimental exercises in elementary chemistry and the chemistry of plant and animal life, intended for students in schools and colleges, and for such the present book will prove a useful and safe guide. This third edition is newly revised and arranged, and it is, perhaps, a little remarkable that there is no mention of nitrate of lime (though calcium cyanamide is referred to). The wide field covered renders the treatment here and there very brief, perhaps too brief to stimulate desire for further knowledge, and makes it rather of the nature of a cram-book.

"The Fertility of the Soil." By E. J. Russell. 8vo., 128 pp. (University Press, Cambridge, 1913.) 1*s.* net.

"Bees and Wasps." By O. H. Latter. 8vo., 132 pp. (University Press, Cambridge, 1913.) 1*s.* net.

We have already referred, more than once, to the excellence of the volumes forming this series of "Cambridge Manuals of Science and Literature." The titles indicate the subjects dealt with in the present volumes, and each, like all in the series, is the work of a master mind, and gives a comprehensive survey of the subject, written in such a way that those previously ignorant of it cannot fail to gain interest and profit from its perusal.

"Garden Flowers as they Grow." By H. E. Corke and H. H. Thomas. 8vo., 197 pp. (Cassell, London, 1913.) 5*s*.

In this book the illustrations are from photographs in colour direct from nature by H. E. Corke, and the descriptive text is by H. H. Thomas. Both are well done, but we venture to disagree with the author when he says the Tree Pæony is hardy. We are well acquainted with several gardens where, in spite of sheltered positions and protection, the young growths are almost every year killed by late frosts, until in two or three years the plants succumb; fresh plants have been put in repeatedly, always with similar results. The book is beautifully illustrated, written in a pleasing style, and boldly printed on good paper.

"Vegetable Growing Made Easy." By O. Thomas and G. Wythes; and "Cooking of Vegetables." By Mrs. Frances Keyzer. 8vo., 185 pp. ("Country Life," London, 1913.) 1*s*. net.

Written by two such well-known authorities as the above, and with such excellent instructions as those of Mrs. Frances Keyzer, on the very important subject of cooking vegetables, this work could not be otherwise than valuable, and the price puts it within the reach of all. Many vegetables admirably grown are often badly cooked or not cooked in the best way, and the reader will find much of interest in this book on the cooking and serving of them. In fact all the information is first-rate.

"Intensive Culture of Vegetables on the French System." By P. Aquatias. 8vo., 192 pp. (Upcott Gill, London, 1913.) 3*s*. 6*d*. net.

So many exaggerated statements have appeared from time to time on French gardening, and so many persons have rushed into it without sufficient capital or technical skill, that we welcome this book from the pen of a thoroughly practical man. Everyone who feels inclined to risk his capital in such a venture should first read this book. That French gardening will pay, the author proves, but only an enthusiastic and skilful man with capital, who is prepared to devote the whole of his time to the work, will succeed. All one could wish to learn on the matter is very carefully considered, and the information is so clear on every point that we heartily commend the book to all who may be interested in French gardening.

"Dahlias." By George Gordon, V.M.H. 8vo., 115 pp. (Jack, Edinburgh, 1913.) 1*s*. 6*d*. net.

Like all the series of these special books dealing with special subjects issued by Messrs. Jack, this volume is very complete and contains everything one could wish to know on the Dahlia. It is well and clearly written, and has an excellent index.

"Commercial Rose Culture, under glass and outdoors." By Eber Holmes. 8vo., 165 pp. (Routledge, London, 1913.) 6*s*. net.

A book written chiefly for America, but containing a fund of valuable information for British readers. In our opinion, however, the price is much too high to find a ready sale in this country. It is well indexed.

"The Potato. A Compilation of Information from every available Source" By E. H. Grubb and W. S. Guilford. 8vo., 545 pp. (Constable, London, 1913.) 8*s*. 6*d*. net.

Mr. Grubb was special commissioner to Europe in potato investigation for the United States Government, and Mr. Guilford is Director of Agriculture, Sacramento, California, and the amount of information they have compiled is enormous. The authors state that 25 per cent. of the food of European and English-speaking people is potatos, and that a 90-bushel potato crop contains 5400 lb. of food, and a 14-bushel wheat crop only 840 lb. Although everyone, rich or poor, recognizes the great value of the potato as a food product, it will be of much interest to quote from this excellent book what Dr. J. H. Kellogg—the well-known authority on food—says:—"The belief is quite general that the potato especially promotes fat-making, and hence must be avoided by persons who have a tendency to obesity. This is an error." And it will be of much interest to quote the following table by Dr. Kellogg.

Food equivalent in total food value to 1 lb. of baked potatos.

1½ lb. of boiled potatos.	7 oz. bread.
5⅞ oz. boiled beef.	1¾ pint of oatmeal.
1 lb. of chicken.	1 pint boiled rice.
1½ lb. of codfish.	1 lb. bananas.
2¼ pints of oysters.	2 lb. parsnips (cooked).
4 pints of clams (in shell).	1 lb. green peas (cooked).
4½ pints of beef juice.	3 lb. beet (cooked).
10 pints of bouillon or beef-tea.	4 lb. boiled cabbage.
1½ pint of whole milk.	4 lb. radishes.
3 pints of skim milk.	5 lb. tomatos.
8 eggs.	5 lb. turnips (cooked).
9 oz. baked beans.	6½ lb. cucumbers.

This table indicates that the potato is one of the most nourishing foods, and it is also recommended by the authors for such diseases as arteriosclerosis, gout, rheumatism, Bright's disease, apoplexy, and other maladies. There is much more information on the dietetic value of the potato. Many products of commercial importance and value are obtained from the potato, showing how important this crop is. Cultivation, manuring, storing, combating and preventing disease, the best varieties to grow, implements, &c., &c., are all exhaustively dealt with, and although the book is written chiefly for American readers, it should be read by every potato-grower and consumer in

his country. In an interesting appendix there is an article on "The World's Food Problem" that deserves the careful study of everyone; in fact, it is seldom one sees a book so full of sound practical matter. It is well and clearly printed, on good paper, well bound, and the only fault we have to find with it is its want of an index. This need may, we hope, be remedied in future editions.

"The Art and Craft of Garden Making." By Thomas H. Mawson. Fol., 404 pp. Fourth Edition. (B. T. Batsford, London, and Chas. Scribner's Sons, New York, 1912.) £2 10s. net.

We feel quite sure that those of our readers who are already familiar with the former editions of Mr. Mawson's important work on garden design will not, upon casually opening the sumptuous volume before us, recognize that it is substantially the same book in a newly revised and enlarged form. And yet a little closer scrutiny will unquestionably reveal the fact that such is the case, and that it is none other than an old friend in a new guise.

To consider it first of all externally, it may be said that in style and get-up generally author, printer, and binder have every cause for congratulation. The book has been enlarged in size and in form, for the previous editions were quarto, whereas the new one is folio, and the literary matter now runs into upwards of 400 pages. It is bound in a neat art canvas cover of sober blue, with gilt lettering. Inside, the typographical execution leaves nothing to be desired. In a large sized, old faced, clean cut type, well spaced, the text is quite a pleasure to read, and the eye experiences no fatigue in its progress over the pages. Modern facilities for book illustration have enabled the author to embellish the book with quite a considerable number of well executed photographic views from actual examples of his work and of numerous garden views, plans, sketches, and drawings of garden accessories, all of which are done in the best possible style. We note, too, in this edition an innovation in the way of seven full-page plates in colour, which with the black-and-whites bring up the total to rather more than a picture for every page.

So much for the book as far as it appeals to the eye only. We have now briefly to give a general idea of the contents, an idea that must perforce be a very superficial one considering the limited space at our disposal and the very extensive area over which the author travels. It must not be thought that this is a book intended only for the use of the professional landscape gardener. On the contrary, every garden-lover will find in its entertaining and readable pages something to interest him beyond professional technicalities. The small suburban amateur, with a refined taste for artistic display in his villa garden, equally with the large landed owner with his country estate, may find ideas as he turns over its pages which may be useful when the time of laying out or altering his garden arrives.

The information and instruction conveyed by the author are

grouped into twenty chapters, which may be summarized as follows :— First, an historical account from early times, in which Monastic and Renaissance gardens are treated, in which also a few words are devoted to the decay of the Italian school and eighteenth-century gardening; followed by observations relative to Repton, Paxton, Kemp, and the modern revival. Chapter II. treats of the practice of garden design, and then we are fairly launched upon the main body of the work, in which we are instructed in the choice of a site, the entrances, gates and fences, the drives and avenues, the terraces, the flower gardens, the lawns, verandahs, summer-houses, pergolas, and bridges. Statuary and all sorts of garden furniture and accessories form another chapter, and this is followed by others on the decorative treatment of water, rock gardens, the various glass structures, kitchen gardens, and the formal arrangement of trees. The three closing chapters contain alphabetical lists of useful varieties of trees for garden and park, of climbers for walls, pergolas, and trellis, and of hardy perennials for beds, borders, &c., the whole covering about 45 pages, and interspersed with illustrations explanatory of the text.

The remainder of the book is devoted to a description, illustrated with various plans and garden views of gardens of various sizes and of exceptional kinds made under the author's supervision; that is to say, from suburban and town gardens to those in the Lake District, in the Highlands, and those occupying unusual sites. There is an index to the illustrations and also a general index, both fully compiled, thus rendering valuable service to the reader, who will not fail to find an abundance of material relating to the garden art not easily found elsewhere, material at once practical and artistic "The Art and Craft of Garden Making" is a work that should find a place on the shelves of every garden library, for much of its teaching is capable of being applied to the modest garden of limited dimensions as well as to those of a more imposing character.

"Les Jardins de France, des Origines à la fin du XVIII^{e} siècle." By Henri Stein. Large 4to. (D. A. Lonquet, 250 rue du Faubourg St. Martin, Paris. 1913.) Price 90 francs (£3 12s.).

This is a handsome collection of 104 loose-leaved plates on stout buff-coloured parchment paper tied up in a canvas cover and accompanied with a prefatory article on the development of the art of garden design in France from the earliest times to the end of the eighteenth century. The work is intended for architects, gardeners, and amateurs who are interested in the subject, and to such will be of much service, for the plates are well executed in photo-collotype and represent many old garden views, plans, mazes, and numerous garden accessories in great diversity. These have been selected from public and private sources, and among them there are some that have never yet been published. The author gives a list of the most important works in garden design, which may also be consulted; there is an index to the localities, giving place and Department, of

the views illustrated, and also a table of the plates, most of which depict several views or subjects of decoration, by which arrangement the total is brought up to nearly 400 reproductions from old prints, designs, drawings, and engravings.

There are some quaint illustrations of gardens produced in the Middle Ages, together with views of some of the most famous castle gardens, of which we may just briefly mention Marly, Meudon, Blois, Montargis, Charleval, St. Cloud, St. Germain-en-Laye, and others.

There has been of late years a considerable revival in France of the interest in artistic garden design, and the work now under notice is only one instance in point. Quite recently our friend M. Albert Maumené devoted a special number of his Journal, "La Vie à la Campagne," to a study entitled "Four Centuries of Garden Design in France," a very valuable contribution, literary and artistic, to our knowledge of the subject. For those who study the gardening art professionally the possession of such works as these becomes a necessity.

"New Roses; being a Supplement to 'Roses and Rose Growing.'" By Rose G. Kingsley. 8vo., 18 pp. (Whittaker, London, 1913.) 6*d*.

Those who possess Miss Kingsley's prettily illustrated book on "Roses and Rose Growing" will probably wish to procure the supplement she has just issued, which forms a little brochure of 18 pages, and as the numbering of the pages begins where the former book left off (omitting the index), the two may conveniently be rebound together.

Since her book was written in 1908 a very large number of new roses have been introduced to commerce, and the supplement is a selected list of these, giving the name of the rose, the date of its introduction, the raiser's name, and the colour of the flower, but no attempt is made to discriminate between them or to describe the purposes for which they are considered suitable; and over 300 varieties are mentioned.

"The Rose Book. A Complete Guide for Amateur Rose Growers." By H. H. Thomas, assisted by Walter Easlea. 8vo., 283 pp. (Cassell, London, 1913.) 6*s*. net.

This "Rose Book" is well illustrated with eight colour photographs by H. Essenhigh Corke, which seem to have been taken by the Lumière process, and sixty-four half-tone plates. The latter are well selected, many of them illustrating the use of roses in the garden or for ornamenting the house or garden buildings, and they will doubtless provide useful suggestions for those who are laying out or altering rose gardens.

The first half of the book or thereabouts is taken up with descriptions of various classes of roses, while the second half is devoted chiefly to practical directions for their management in garden or greenhouse. This latter half, which seems to be the better part of the book, is clear, and gives all necessary directions, and when operations requiring

some manual dexterity, such as budding or pruning, are described, illustrations are given in the text to show how the work should be accomplished. The illustration of the proper way to cut a shoot when rose pruning is a little puzzling at first, but if the reader will remember that the shoot is to be cut upwards and not downwards all will go well. The illustration in question shows clearly the necessity of firmly grasping the lower part of the branch when severing the stem with the knife, a very necessary precaution if an accurate and clean cut is to be made. The improvement in the making of sécateurs, however, is gradually settling the long controversy between knife and sécateurs in favour of the latter. "If," say the authors, "one has a moderately large collection of roses the use of the knife renders the work of pruning a very lengthy one. Very few rosarians, I imagine, now make use of the knife; the sécateurs have taken their place. Blunt or ill-made sécateurs bruise instead of cutting the shoots, but providing a good instrument is obtained and the blades are kept sharp, there is nothing to be urged against their use and much to be said in their favour." There are no doubt many inferior makes of sécateurs often employed in gardens, but instruments can now be obtained that will cut cleanly and with the precision of a surgical instrument, so that there is no longer any excuse for careless work in this respect.

Now that so much attention is being directed to the treatment of the numerous diseases and pests which attack our roses, one turns naturally, and with some interest, to the chapter on this subject which is written by Mr. H. H. Aitken. Its perusal leaves the impression that the author is but little inclined to put faith in heroic methods, and would rely rather on good methods of cultivation and prevention than in attempts to cure the established disease. He considers the disease known as black spot is becoming more widely distributed, and that no real cure has yet been found for it. We think, however, that while he admits its evil effects he fails to grasp fully how very serious the disease is in our gardens. Now that we want our roses to last into October or even December, to find a bed stripped of its leaves in the middle of summer is most unfortunate, and if it be in an important position in the garden the effect may be disastrous, for the plants will be of little further use for that year, and moreover will be more prone than they otherwise would be to suffer from the frosts of the following winter. A safe and effective remedy that would extirpate the disease at its onset is much to be desired by rosarians.

The book contains an excellent calendar of operations round the year in the Rose garden. The writers recommend the application of manure in autumn to be dug into trenches between the plants. No doubt where manure is applied at this season this is the best method of doing it, but it may be questioned whether it is well to lay down too arbitrary a rule on the matter. To get the best results out of his garden the gardener should study his own particular soil, and it is not unlikely that there are soils, particularly of a light or sandy nature;

where spring manuring may give better results than too slavish an adherence to a precedent which may be good in other districts. It is however fair to say that the laying down of hard and fast rules is not generally a fault of this book.

Taken all round it is a readable little book, and its good illustrations and moderate price should make it popular.

"The Kitchen Garden and the Cook. An Alphabetical Guide to the Cultivation of Vegetables, with Recipes for Cooking Them." Collected and arranged by Cecilia Maria Pearse. 8vo., 284 pp. (Smith, Elder, London, 1913.) 5*s*. net.

The chapters dealing with the cultivation of vegetables and the recipes for their use naturally take up the major portion of this book. There is an excellent appendix on successional cropping in small gardens and on little-known vegetables. It will interest many to see what a number of different modes there are of cooking and serving vegetables, and the book should find a hearty welcome in every household where vegetables are appreciated. We should have liked to see more reference to pickled vegetables and chutneys, as, for instance, Capsicums and Chillies, which are only mentioned briefly in the appendix, and then only for cooking. Yet we know many who greatly enjoy pickled Capsicums, and the same applies to Cauliflower, &c. Salads are admirably treated upon, and the recipes are well worth studying. In fact, the book supplies a long-felt want. The contents are in alphabetical order, and clearly and boldly printed.

"Mushroom Culture." By W. Dyke. Obl. 8vo. 88 pp. (Lockwood Press, London, 1913.) 1*s*. net.

A capital little brochure in paper covers, written by a practical man who has been growing this esteemed article of diet for twenty-five years. It fully describes all the essential details of cultivation both inside and out for commercial purposes, giving full particulars of all costs, prices, markets, pests, diseases, &c. There is a table of contents and a good index at the commencement of the book.

"The Production and Utilization of Scots Pine in Great Britain." Part 1, Production No. 1. Sample Plots at Woburn. By E. Russell Burdon, M.A., and A. P. Long, B.A. 8vo., 46 pp. (Cambridge University Press, 1913.) 1*s*. 6*d*. net.

This is an interesting inquiry, though it may be well to bear in mind that already much has been done in the same direction, as reference to the Transactions of "The Highland and Agricultural Society of Scotland," "Royal Scottish Arboricultural Society," and the pages of "Woods and Forests" will show. It would appear, however, that in the "Scope of the Inquiry" one of the most essential and important points has been overlooked, viz.: an investigation into (1) whether in raising young trees for purely economic purposes home or foreign

seed should be used, and (2) from what particular altitude, situation or country should these be obtained.

Already it is well known that a spurious and sadly degenerate variety of Scots Pine is widely scattered over the British Isles, and except in a few situations, such as in Bedfordshire, Aberdeenshire, and Carnarvonshire, the timber produced by this inferior tree is comparatively valueless for construction purposes. Even in Aspley Wood we found the quality of timber to be by no means uniform, and this the lath-renders and timber merchants in the district knew full well. No doubt, too, soil has much to do with the quality of timber, and it is a somewhat curious coincidence that at Gwydyr Castle and in the pass of Nant Francon in Wales, as well as in at least two English stations, the composition of soil nearly approaches that from Ballochbuie and other Scottish forests where the finest quality of Scots Pine wood is produced. But this is only mentioned incidentally to point out the necessity for a careful study of the particular tree that produces the most valuable timber.

The numerous tables which are provided at much labour and expense, though highly interesting, are of no great value; indeed, the main scope of inquiry appears hardly to be in the right direction.

Why the Weymouth Pine (*Pinus Strobus*) is excluded from the list of such as are considered to be of economic value is hard to say, for in some parts of the country when suitably situated as to soil and surroundings it produces a greater quantity of much more valuable timber than either *Pinus Pinaster*, *P. insignis*, or the Corsican. In Aspley Wood too, where observations are being carried out, the natural reproduction of the tree is somewhat remarkable.

"Fruit and its Cultivation." By T. W. Sanders, F.L.S., F.R.H.S. 8vo., 366 pp. (Collingridge, London, 1913.) 6*s*. net.

To add another book to the already voluminous literature of fruit culture requires for its justification either the need to publish the results of researches or the ability to state its principles in an exact and clear manner. The work before us claims no originality, and is written for the owners of small gardens and for small-holders. It is necessary, therefore, only to see if the old and well-known truths are clearly and justly stated.

The author treats of the cultivation of all hardy fruits, and gives a chapter to each of them, divided into historical, descriptive, and cultural sections, and it will be convenient to examine them in this order.

In the historical part the author has relied largely on one Henry Phillips, who published a history of fruits in the early part of the last century. Now, Phillips was a bookmaker. We therefore see once again that Lucullus brought the cherry to Italy from Kerasoun, and other legends of equal authenticity which our great-grandfathers were taught and which, it seems, despite de Candolle, Hehn and others, will be dished up again to our grandchildren. On other historical

matters the author is equally astray. Thomas Andrew Knight, Robert Hogg, and Thomas Rivers are credited with the introduction of dwarfing stocks for apples and pears, the evidence of Miller's "Dictionary" and Gerard's "Herbal," to mention no earlier record, being overlooked. The 'Nonsuch Paradise' is stated to be a seedling from the 'Paradise' apple; it was raised from a seed of the old 'Nonsuch' apple.

A reference to the "New English Dictionary" would have shown that the origin of the word Filbert from "full-beard" is not now held in competent quarters; and the derivation of "Cider" from the Anglo-Saxon "Sieder" seems to be a new contribution to philology.

But these matters are not, it may be presumed, of much importance to the "small-holder," and we therefore pass on to the descriptive portion.

A selected list of each fruit is given, together with a short description of some three or four lines, which, as the type is large, do not give as much information as is found in most nurserymen's catalogues. Under these conditions it is hardly possible to give any valuable facts about many characters. "Shape round," for instance, describes the form of such apples as the 'Duke of Devonshire,' 'Mr. Gladstone,' 'Charles Ross,' and 'Kerry Pippin.' In the pears "pyriform" is equally applied to 'Jargonelle,' 'Nouvelle Fulvie,' and 'Conference'; and "obovate" both to 'Fondant d'Automne' and 'Beurré Superfin.' It is obvious that description of this sort is useless, even presuming a knowledge of botanical terms in the owner of the small garden.

The choice of the fruits themselves follows the generally accepted lists, though we question the wisdom of including untried novelties, as is done in some cases.

In the cultural sections there is much information that is useful, though it is not always expressed in language sufficiently clear. We wonder what a "small-holder" would make of the following instructions for making cuttings, the context of which gives no definition of terms:—"Cut off the base straight across, close to a joint, and also remove the soft unripened part close to a bud." In the direction for budding it is stated that shield budding "is practised in summer on shoots of the current year's growth!" The advantage of budding, we are told, is that should the buds fail the stocks can be grafted in the spring. We fancy nurserymen could point to other advantages of more weight. Further, in the directions for budding no instructions are given as to what height from the ground the bud is to be inserted, a point of some importance.

Some eighteen pages are given up to the various insect and fungus pests and their remedies, and the instructions given are generally reliable. We find, however, no mention of the necessity of killing the root form of the American blight, or the means by which it may be accomplished.

The Latin names are, on the whole, correctly given, though we notice one or two slips.

The chapter on manuring is detailed and useful, and we are glad to note the importance of lime and phosphatic manures emphasized.

Some chapters on market-fruit culture and spraying by Mr. W. E. Bear, who is better known as "A Southern Grower," are of value, and useful tables are added.

Generally speaking, the work betrays careless production and slipshod editing. To figure, as on page 244, a tree of 'Stirling Castle' apple as a "free grower which requires root-pruning to check excessive growth" will amuse those who grow this apple and know it to be one of the very worst growers of all; and to recommend that the 'Strawberry Raspberry' requires to be treated as the "herbaceous" autumnal raspberries can only mean that the author has never seen the plant.

A chapter on the "pollination of fruits" seems to have been added as an afterthought, as no reference is made to the subject in the section on "Unfruitful Trees."

This book is decorated with many photographs with more or less application to the text, and with small cuts to show methods of training, &c., and contains an index.

"A Pilgrimage of British Farming." By A. D. Hall, M.A., F.R.S. 8vo., 446 pp. (John Murray, London.) 5*s*. net.

The publication of this book, which is a reprint of articles which appeared in *The Times* in 1910–1912, following upon Mr. Prothero's "English Farming" and the description of a tour of a somewhat similar character which Sir Rider Haggard gave us in his "Rural England" in 1902, are signs, if any were wanting, of the revival of interest in agriculture since the end of the last century, the townsman at last beginning to realize that, after all, agriculture is one of our important national industries. The great difference between this book and Sir Rider Haggard's is that whereas the conclusions of the latter, at a time when farming had only just emerged, and in some districts was only just emerging, from the great depression of 1875–1895, were decidedly pessimistic, at least as regards the farmer of the average holding of 200 acres, Mr. Hall, on the contrary, holds that "to a man who takes the trouble to learn, and attends to his business, farming now offers every prospect of a good return on his capital," and he doubts "if there are many more profitable enterprises open at the present day than would be provided by a 2000-acre farm on good land with an adequate backing of capital." Those who think the farmer is one of a class who just muddle along might note his remark that "it would be very hard for the most enlightened and scientific expert to show him how to improve his business," though he is speaking of a good example of the class of men farming 150 to 500 acres. But he admits that one often sees bad farming in England alongside the best, which he attributes not so much to lack of knowledge as to the low mental calibre of the man occupying the land, and holds that what the ordinary farmer needs above all things is not so much additional technical knowledge, which has now become

so general, as the better education which will give him the more flexible habit of mind that comes with reading. Landlords come in for criticism not so much in their relations with their tenants as in their deficiency of leadership, there being no one nowadays to set beside Coke of Norfolk. At the other end of the social scale is the labourer, whose wages are estimated as being now equivalent, or more than equivalent, to a pound a week all over the country. To the farmers' complaint that the men are not worth their wages, Mr. Hall replies that they will have to be more highly paid still before they will earn their money. He is not very sanguine as to the success of small holdings generally, except as adjuncts to other employments, and especially as stepping-stones whereby the labourer can make a start at becoming a master himself.

We have dealt at this length with the author's general conclusions because we hold that with his experience as head (until recently) of the world-famous Rothamsted Experiment Station, the benefit of which he has given to the public in some of the leading text-books of agricultural science, and now as Development Commissioner, there are few living men so well qualified to express an opinion on the subject, especially after such a comprehensive tour as that described in this book, including as it does, not only English, Welsh, and Scotch farming, as the title indicates, but Irish as well.

Those with a practical knowledge of farming will be interested in the descriptions of the diverse kinds of farming—perhaps no other country of equal area presents such widely differing forms as our own—and it need hardly be said the author pays special attention to the geological formation of the soils and the varying systems of crop relation which have been found best adapted to their needs, the old Norfolk four-course, where followed in principle, being now generally altered to a five-course shift consisting of roots, barley, seeds, wheat, and oats, or other spring corn. He also speaks with the authority of an expert on the various breeds of sheep and cattle, and expresses surprise that "although Great Britain is the fountain-head from which every other great stock-producing country draws its blood, the general level of the animals which may be seen on sale at any local market is below that which prevails, say, in Canada or the northern United States." As regards Welsh farming generally, it is considered to be undeveloped and below the opportunities offered by the soil and climate. In Scotland the general average of farming is higher than in England. He takes a hopeful view of Irish farming, finding men on the look-out everywhere for improvement, and in County Down he was "surprised by the obvious prosperity and comparative wealth of the men farming 40 to 60 acres."

But those also whose knowledge of farming is only over the hedge will find much to interest them, principally in the specialist farming, which is often described in some detail. We read of the high farming round Dunbar, where potatos are the staple crop and rents run as high as 90s. an acre, probably the most highly-rented arable (not

market garden) land in the world. The raspberry-growing of Blairgowrie, where the gross returns in a single season have been as much as £120 per acre, provides a remarkable lesson in co-operation. The Ayrshire potato-growing, the market-gardening round Penzance, the fruit-growing in the vale of Evesham and about Wisbech, the fruit and hops in Kent, and the flax in North Ireland are all described in a most interesting way, as are also the Ulster tenant-right, the Evesham custom, the primitive system of land tenure in the Isle of Axholme (Yorks), and the warping of the low land by which it is surrounded.

Space forbids us to say all we could wish about this fascinating book, and we will conclude with one of the many significant remarks of the author: "It is well to remember that over a large part of Great Britain the factor which to-day chiefly limits the yield of grain per acre is the lack of sufficiently stiff-strawed varieties."

"Manures and Fertilizers." By Homer J. Wheeler, Ph.D., D.Sc. 8vo., 389 pp. (Macmillan, New York, 1913.) 7*s*. net.

The appearance of another book on this subject is proof of the spread of the scientific cultivation of the soil. When we began attending lectures on the cultivation and manuring of soils twenty years ago there was little choice of text-books, there being only one standard work of reasonable price. Now they are legion. This work is intended to meet the needs of both students and lecturers in agricultural schools and colleges in the United States, as well as of the rapidly increasing number of those who are interested in the scientific phase of modern farming. It is well adapted for use as a text-book, while the fulness of its index and the comprehensive analyses of its chapters—each paragraph or group of paragraphs being numbered, with the subject in bold type—make it very convenient for use as a work of reference by the busy practical man.

The author's object is not to give rule-of-thumb directions, but to aid in inculcating such general principles as shall aid in making the student as independent of them as possible, and at the same time furnish a foundation upon which to base his future studies in the manuring of his soil. Each class of fertilizers has a chapter to itself, while three chapters are given to the nature, use, and preservation of dung. The much-discussed subject of the most profitable and economical way of using it is gone into at some length, and the author is of opinion that this is best effected in the field by the use of small or moderate applications rather than large ones, and that from the standpoint of the conservation of ammonia there is much to be said in favour of incorporating it with the soil in a fresh state, the losses under this system from denitrification being small in comparison with those arising under other methods of treatment (pp. 55–59).

While commending the book generally it must be pointed out that it is capable of some improvement in the next edition in the matter of clearness of meaning in some places, as, for instance:—

On p. 59. "Partially rotted manure is much superior . . . to

. . . fresh manure; for the former is much more heavily charged with food for the denitrifying organisms than that which has undergone a greater amount of fermentation."

On p. 115. "It was found . . . in the warm climate . . . that organic nitrogen was superior to nitrogen in sulphate of ammonia due, presumably, to the rapid nitrification of the former, and to its loss by drainage before the plants could utilize it."

On p. 164 we read: "The total sales of cyanamid are claimed to have risen in two years to 4,000,000 tons per annum." An obvious error.

On p. 259. "The effect of potassium salts upon wheat and barley . . . has been found to be far more favourable in wet than in dry seasons, due possibly to its preventing premature ripening."

On p. 364. "The protozoa probably concerned in the destruction of the bacteria were found to be," &c.

These errors and obscurities will doubtless be put right in the next edition.

"Camping in Crete; with Notes upon the Animal and Plant Life of the Island." By Aubyn Trevor-Battye, M.A., F.L.S. 8vo., xxi + 308 pp. Map. (Witherby, London, 1913.) 10*s.* 6*d.* net.

This is a charming and straightforward tale of journeys in Crete, told simply and well by an observant traveller-naturalist, with an eye for plants and birds and beasts, an interest in the people and their ways, and a liking for getting at the meaning of ancient buildings and remains. The plates which adorn the text are excellent, and there is a capital chapter on the Cretan caves by Dorothea M. A. Bate, who also contributes notes on the mammals. The garden-lover will naturally turn to the notes on the Cretan flora with expectancy and he will not be disappointed, for, although short, they are very informing. Not a few are garden plants, and the notes on the five Cretan Cistuses are extremely interesting. We gather the author secured some bulbs of *Chionodoxa nana*. Does anyone else grow it in England?

"The Fungi which cause Plant Disease." By F. L. Stevens, Ph.D. 8vo., ix + 754 pp. (Macmillan, New York, 1913.) 17*s.* net.

One of the chief difficulties the worker with plant diseases has to contend against is that of finding descriptions of disease-causing fungi, so that they may be recognized. The literature is very scattered, and Professor Stevens has done well to bring together the matter in this volume within the covers of one book. Not only are descriptions given, but bibliographical references which the student will find of great value. The book is supplementary to the author's "Diseases of Economic Plants," and contains no references to preventive and remedial measures, or to the grosser symptoms produced by the fungus attack; these must be sought in the former volume and in others of a like nature. It is well illustrated, and a book which every worker with plant-disease fungi must needs have upon his shelves.

"The Diseases of Tropical Plants." By M. T. Cook, Ph.D. 8vo., xi + 317 pp. (Macmillan, London, 1913.) 8*s.* 6*d.* net.

It is only within comparatively recent years that research into the diseases of tropical plants has become possible in tropical countries, where only it can be carried out with the best chances of success. Not a little help was given in early days by our own mycologists in recognizing the causal organisms, but something more than this is required—much more, if the means of combating troubles due to fungus attack are to rest upon any more sure ground than empiricism. We are waking to the fact that not only are parasites worthy of study, but the host is too, and a full knowledge of the ways of both is necessary if progress is to be made. No science of vegetable pathology can be built without a foundation of vegetable physiology; no appreciation of the plant's condition in disease can be acquired without a complete apprehension of its condition in health, and this is only likely to be gained by study under the normal conditions of its life. The proper place for such a study is in the garden, with all the appliances of the laboratory to one's hand. Professor Cook's is the first book dealing solely with the diseases of tropical plants, and will, we doubt not, be of immense value to those engaged in the cultivation of tropical plants.

"Webster's Foresters' Diary and Pocket Book." (Rider, London, 1914.) 2*s.* 6*d.* net.

This is a pocket diary, well got-up, somewhat similar in style to our "Gardeners' Diary," but containing a vast deal of information relating particularly to forest and ornamental trees and their management. It will be found a very useful book for those engaged in forest and ornamental tree planting and cultivation.

"My Garden in the Wilderness." By K. L. Murray. 8vo., 186 pp. (Thacker, London [1913].) 6*s.* net.

The wilderness was under Indian skies, and this little book is a book about the gardens made and the dogs the writer had in them, interspersed with memories and musings. It is not a guide to garden-making either in the wilderness or out of it, but one of those little books, pleasing to read, many of them, more or less about gardens, which are so numerous since "The Garden that I Love," the charming works of "E. V. B.," and Mrs. Earle's "Pot-pourri from a Surrey Garden" gained upon the garden-lover's ear.

"Genera of British Plants." By H. G. Carter, M.B. 8vo., xviii + 121 pp. (University Press, Cambridge, 1913.) 4*s.* net.

This is the first book containing descriptions of the genera of British plants following the arrangement of Engler's "Syllabus der Pflanzenfamilien." The arrangement of the "Syllabus" is constantly undergoing change as research throws new light upon the life-histories and structure of plants, and this follows the seventh (1912) edition.

Students will find it very useful, as it gives a truer idea of the probable course of evolution of plant genera than does the ordinary arrangement.

"A Naturalist in Western China, with Vasculum, Camera, and Gun." By Ernest Henry Wilson, V.M.H., with an introduction by Charles Sprague Sargent, LL.D. Two vols., with 101 full-page illustrations and a map. (London: Methuen & Co., Ltd. 1913.) Price 30*s.* net.

Mr. Wilson is well known to readers of this JOURNAL as one of the select few who have been awarded the Victoria Medal of Honour by the R.H.S. His introductions from China are also familiar to all who cultivate hardy plants or who frequent horticultural exhibitions.

Mr. Wilson's travels in China commenced early in the year 1899, and comprise four distinct expeditions extending over a period of eleven years. The first two journeys were on behalf of Messrs. Veitch, the others in the interests of the Arnold Arboretum of Harvard University. An account of these journeys, with observations on the country, the people, the plants, birds, and animals met with, furnishes material for two volumes of most interesting reading.

The country explored by Mr. Wilson and described in his book embraces Western Hupeh, Szechuan, and various non-Chinese States on the Chino-Tibetan borderland. This region lies within the Yangtsze river basin, west of the famous Ichang gorges, which are situated about 1000 miles from the mouth of the Yangtsze river. The first volume opens with a description of the wonderful mountain ranges of Western China and of the complicated river-system to which they give rise. With the exception of the Chengtu Plain there is an entire absence of plain or plateau or anything in the nature of level country. In Western Hupeh, in the neighbourhood of Ichang (Mr. Wilson's starting-point for the west), the country is particularly wild and savage, and, being sparsely populated, presents to the explorer an exceedingly arduous task. It has, however, an extremely rich flora, due to the fact that the native vegetation has to a great extent been left unmolested. It was in this region that Mr. Wilson met with the beautiful lilies *Lilium Henryi*, *L. Brownii*, and the varieties *chloraster* and *leucanthemum*.

Extending west from the Hupeh boundary to the valley of the Min River is the "Red Basin of Szechuan," so called from the red clayey sandstone of which the soil and rocks are composed. At some remote period this area was, in all probability, a vast inland lake, and, as Mr. Wilson points out, the differences between the floras on its eastern and western border-ranges lend colour to the theory that a boundary, such as a large lake would be, previously existed. At the present time the "Red Basin," drained by the Yangtsze and its tributaries, is a network of rolling flat-topped mountains, and a rich and fertile agricultural region of terraced fields. Still further to the west is the Chengtu Plain, the "Garden of Western China," where

agriculture attains its maximum development. In length from north to south about 80 miles and in breadth about 65 miles, the Chengtu Plain has a population of probably more than 6,000,000. Its extraordinary fertility is in a large measure due to the wonderful system of irrigation inaugurated by Li-ping more than 2000 years ago.

Although a region of much interest, it is far too intensely cultivated to be a happy hunting-ground for the botanical collector, and Mr. Wilson is much more enthusiastic when describing his cross-mountain journey to Sungpan-Ting, in the extreme north-west of Szechuan. On this journey, we read, the "Summer Lilac" (*Buddleia Davidii*) "delighted the eye on all sides" and numerous specimens of trees and shrubs were collected ere Sungpan was sighted, "nestling in a narrow smiling valley, surrounded on all sides by fields of golden grain, with the infant Min, a clear limpid stream, winding its way through in a series of graceful curves. In the fields the harvesters were busy; men, women, and children, mostly tribes-folk, all pictures of rude health, laughing and singing at their work. Under a clear Tibetan-blue sky, the whole country bathed in warm sunshine, this busy scene . . . gladdened our hearts, fatigued and exhausted as we were with the hardships of our journey."

The wild and savage region vaguely termed the Chino-Tibetan borderland was next explored, and the exertions of the traveller were rewarded by many rich finds. In the Min valley "the charming *Lilium regale* luxuriates in rocky crevices." In the Tung Valley "*Lilium Sargentiae* is very abundant in rocky places amongst grass and scrub." "The bulbs of *Lilium tigrinum* and *L. Thayerae* are cooked and eaten," and several other species, "including the lovely *Lilium Bakerianum*," also occur. At Sungpan-Ting Mr. Wilson determined on a journey to Tachienlu, "The Gate of Tibet," by way of a route first described by Sir Alexander Hosie, who traversed it in 1904. From Kuan Hsien as a starting-point the journey occupied twenty-three days, through a wonderful country possessing a rich alpine flora. He says: "Up to 10,000 feet altitude *Cypripedium luteum* is not uncommon . . . above 11,500 feet the gorgeous *Meconopsis integrifolia* covers miles of mountain-side! . . . various kinds of Senecio, Trollius, Caltha, Pedicularis, and Corydalis added an overwhelming display of yellow . . . all the moorland areas were covered so thickly with the Tibetan Lady's Slipper (*Cyp. tibeticum*) that it was impossible to step without treading on the huge dark-red flowers . . . the most fascinating herb of all was, perhaps, the extraordinary *Primula vincaeflora* with large solitary violet flowers resembling those of the Periwinkle . . . the whole country-side was a feast of colour." The sacred mountains Omei Shan and Wa Wa-Shan were also explored by Mr. Wilson, the latter for the first time on record. Both are gigantic upthrusts of limestone situated in the Laolin country. The flora of Omei Shan is particularly interesting on account of its well-marked "floral zones," but from a botanical standpoint Mr. Wilson describes Wa Wa-Shan as disappointing. Another sacred mountain, Wa Shan,

often confused with Wa Wa-Shan, was ascended, and here the explorer was rewarded by the feast of colour which the Rhododendrons provided. To quote Mr. Wilson again: "The gorgeous beauty of their flowers defies description. They were there in thousands and hundreds of thousands. Bushes of all sizes, many 30 feet high and more in diameter, all clad with a wealth of blossoms that almost hid the foliage."

In the second volume is given a brief but valuable summarized account of the flora of Western China, which Mr. Wilson describes as the richest temperate flora in the world. He himself collected some 65,000 specimens, representing about 5,000 distinct species, in that region. The Chinese flora is apparently closer akin to that of the eastern United States than to that of the Asiatic continent, a fact first observed by the late Dr. Asa Gray, and in this connexion the comparative study of the forest flora of eastern North America and China which Prof. Sargent contributes in his introduction to Mr. Wilson's book will be read with interest.

Other chapters deal with the timber trees of Western China, the field and garden crops, and the more important economic products and minerals. Hitherto the information on these subjects has been scattered and often faulty, so that the economic botanist and merchant will find in this section a valuable work of reference.

On his last journey Mr. Wilson was accompanied by Mr. W. P. Zappey, who made a zoological collection that is now in the Museum of Comparative Zoology at Harvard University. Mr. Wilson's own observations on the fauna of Western China, coupled with the information obtained through association with Mr. Zappey, have enabled him to give a valuable account of the game birds and game animals that are native to Western China, and in the chapters devoted to thes subjects the sportsman will find much of interest. The volumes are illustrated by excellent photographs, which, with a few exceptions, were taken by Mr. Wilson himself. He, however, attributes much of his success as a photographer to the assistance of Mr. S. J. Wallis, of Kew, who developed all his negatives and obtained from them the best possible results.

Mr. Wilson is first of all a botanist, but he has also the observing eye of the experienced traveller, and, as will have been gathered from the foregoing remarks, his book treats of many subjects and will on this account appeal to many classes of readers. Perhaps the most numerous class will comprise those who cultivate Chinese plants and who wish to know something of the country where they are native and of the conditions under which they grow naturally and also of the arduous journeys which their introduction to cultivation involved. To this class of reader Mr. Wilson's volumes will prove of absorbing interest and a storehouse of valuable information.

The work is provided with a good index and with a valuable map, the latter adapted by Mr. B. V. Darbishire from the War Office map of Eastern Ssu-ch'uan.

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TRIGGS, H. I. Garden craft in Europe. London (1913). il. pl. port. la. 8vo. (2)

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VENTENAT, E. P. Description des plantes nouvelles et peu connues, cultivées dans le jardin de J. M. CELS. Paris [1800]. 100 pl. fol. (1)

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—— Continuation der Nürnbergischen Hesperidum. . . . Nürnberg, 1714. pl. frontis. fol. (1)

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—— Observations on modern gardening, and laying out pleasure-grounds, parks, farms, ridings, &c., illustrated by descriptions. To which is added, an essay on the different natural situations. A new edition : with notes by H. [WALPOLE] . . . London, 1801. col. pl. 4to. (1)

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CANNELL, Messrs., Loddon. Pea 'Cannell's Ideal Dwarf.' See p. 674.

CARTER, Messrs., Raynes Park. Peas (see p. 674); potatos (see p. 702); tomatos (see p. 407); turnips (see p. 707); miscellaneous flower seeds (see p. 665); beans (see p. 714); tulips (for nomenclature trial).

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DANIELS, Messrs., Norwich. Potatos (see p. 702); Antirrhinums (see p. 633).
DAVIDSON, D., Dingwall. *Meconopsis Wallichii*. Planted in garden.
DAVIES, P., Lytham. Melon 'Sentinel.' For trial 1914.
DAWKINS, A., Chelsea. Tulips. For nomenclature trial.
DE GRAAFF, Messrs., Leiden. Tulips. For nomenclature trial.
DELMARD, A., Bulgaria. *Primula frondosa*. Growing on.
DICKSON, Messrs., Belfast. Peas (see p. 674); tomatos (see p. 407); violas (see p. 381).
DICKSON & ROBINSON, Messrs., Manchester. Antirrhinums (see p. 633); peas (see p. 674); tomatos (see p. 407); turnips (see p. 707).
DOBBIE, Messrs., Edinburgh. Sweet peas (see p. 665); Antirrhinums (see p. 633); tomatos (see p. 407); Aquilegias (growing on); potatos (see p. 702); peas (see p. 674); turnips (see p. 707); collection of Roses (planted in garden).
DOCK, Miss, Pennsylvania. Seeds of *Kalmia latifolia*, *Lobelia cardinalis*. Sown.
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EVANS, J. S., Newbury. Collection of seeds. Sown.
FAIRBRIDGE, Miss, East Grinstead. Seeds from Africa. Sown.
FAULKNOR, A., Hungerford. Raspberry 'Inkpen Prolific.' Added to collection.
FERGUSON, G., Kendal. Seedling Gloxinias and Aralias. Growing on.
FITZGERALD, L., Ripley. Seed of West Australian Broom. Sown.
FLEMYNG, Rev. W., Coolfin. Collection of seeds. Sown.
FLETCHER, H., Amesley. Potatos. See p. 702.
FORBES, Messrs., Hawick. Miscellaneous flower seeds (see p. 665); Violas (see p. 381); Pyrethrums (growing on); Cape Pelargoniums (added to collection).
FRASER, J., F.L.S., Kew. Seeds of Pelargoniums. Plants raised.
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GRABENER, Professor, Karlsruhe. Cuttings of *Pelargonium tricolor*. Growing on.
GRAINGER, D. E., Skelton. Tomato 'Grainger's Surprise.' See p. 413.
GRAY, Z., Sandy. Turnip 'Eclipse.' See p. 707.
GRIER, R. M., Barrhead. Violas. See p. 381.
GUILDFORD HARDY PLANT NURSERY. Irises. Growing on.

HALES, W., A.L.S., Chelsea. Cuttings of *Pelargonium echinatum*. Growing on.
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HARMON, W., Lutterworth Tomato 'Newnham Paddox Prolific.' See p. 414.
HAYWARD, P. S., Clacton-on-Sea. Antirrhinums (see p. 633); Violas (see p. 381).
HAZELWOOD, D., Aberford. Melons. To be grown 1914.
HEALD, W., Weybridge. R.H.S. Journals. Added to Library.
HEINEMANN, F. C., Erfurt. Turnips (see p. 707); potatos (see p. 702); Antirrhinums (see p. 633); Violas; Tomato 'Lucullus' (see p. 411).
HILL, V. T., Langford. Patent slug traps. For trial.
HOBBIES, Messrs., Dereham. Rose 'Pink Pearl.' Planted in the garden.
HOGG & ROBERTSON, Messrs., Dublin. Tulips. For nomenclature trial.
HOLMES, E. M., Sevenoaks. Cuttings of *Pelargonium odoratissimum*; various seeds (sown).
HOLMES, W. G., Tain. Peas. See p. 674.
HOMEWOOD, Mrs., Ealing. Seed of Tonga Bean. Sown.
HORTICULTURAL CLUB, Hôtel Windsor, S.W. Books for Library.
HUDSON, J., V.M.H., Acton. Heliotrope 'Mrs. Hudson.' See p. 665.
HURST, Messrs., London. Antirrhinums (see p. 633); peas (see p. 674).
INGALL, W., Louth. Apple 'Ingall's Seedling.' Added to collection.
INGLIS, J. C., Dover. Seeds of *Iberis gibraltarica* and Alpine Wallflower. Sown.
INGWERSON, W. E. T., Croydon. Androsaces for rockery.
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JEYES' SANITARY COMPOUNDS Co., London. Summer, nicotine, new flower, and winter washes. For trial.
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KEW, ROYAL BOTANIC GARDENS. Collection of seeds. Plants raised for distribution.
KIEFT, Messrs., Limmen, Holland. Tulips. For nomenclature trial.
KIME, T., Boston. Potatos. See p. 702.
KING, G. R., Romford. Potato 'Aristocrat.' See p. 702.
KING, G., Worthing. Asparagus. Growing on.
KINGS ACRE NURSERY Co., Hereford. Stocks for apples.
KINGSCOTE, T., Cirencester. *Hydrangea quercifolia*.
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KRELAGE, Messrs., Haarlem, Holland. Tulips. For nomenclature trial.
KRUMBHOLZ, E., Bognor. Collection of plants for rockery.
LANGWORTHY, C. D., Claygate. Cuttings of *Sempervivum arboreum*.
LAWRENCE, Sir TREVOR, K.C.V.O., V.M.H., Dorking. Bulbs of *Crinum Johnstonii* (planted in garden); bulbs of *Tecophilaea cyanocrocus* (planted in garden); *Dendromecon rigidum* (planted in garden).
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LOW, Messrs., Bush Hill Park. Figs. Added to collection.
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MACDONALD, J., Harpenden. Grass seeds. Sown.
MACKENZIE, Mrs., Petersfield. Plants for rockery.
MAGOR, E. J. P., St. Tudy, R.S.O., Cornwall. Seedlings of:—Rhododendron 7463 (Forrest); Rhododendron 5868 (Forrest); Hypericum 8020 (Forrest); Rhododendron 4271 (Wilson); Rhododendron 8923 (Forrest); *Rhododendron Fortunei cyanocarpum*: Rhododendron 8939 (Forrest); Vaccinium 7702 (Forrest); and the best yellow form of *Rhododendron Falconeri*. All growing on. Seeds from China. Sown.
MANSELL & HATCHER, Messrs., Rawdon. Liliums. Planted in garden.
MARSHALL, W., V.M.H., F.E.S., Bexley. Ferns for rock garden.

MARTIN, C., Newport. Tomato 'Solidarity.' See p. 413.
McCALMONT, Lady, London. Rose (planted in garden); poppy seed from Kashmir (sown).
McDOUGALL, Messrs., Manchester. 'Katakilla' Wash. For trial.
MICHIGAN AGRICULTURAL COLLEGE, U.S.A. Collection of seeds. Plants raised for distribution.
MOORMAN, J. W., Hackney. Seed of Digitalis. Sown.
MORTER, W. H., Birmingham. Violas. See p. 381.
MOWATT, Mrs., Haslemere. *Berberis Darwinii*. Growing on for distribution.
MOWLL, Dr., Surbiton. Seeds. Sown.
MÜLLER, H., Camberley. Plants for the garden.
NAPLES BOTANIC GARDEN, Italy. Collection of seeds. Plants raised for distribution.
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NITROGEN FERTILIZERS LTD., London. Nitrate of Ammonia. For trial.
NORTH-ROW, W., Tiverton. Seeds from Norway. Sown.
NUTTING, Messrs., London. Peas (see p. 674); turnips (see p. 707).
OGILVY, Mrs., Byfleet. Plants for rockery.
OXFORD BOTANIC GARDEN. Gloriosas and *Gloxinia maculata*. Growing on.
PAM, A., Bishops Stortford. *Hymenocallis Amancaes*. Growing on.
PAUL, Messrs., Cheshunt. Plants for garden.
PAYNE, H., London. Various seeds. Sown.
PEARSON, Messrs., Lowdham. Stocks for Apples; Tulips (for nomenclature trial).
PERRY, A., Enfield. Collection of seeds (plants raised); Irises (growing on).
PETTIGREW, A. A., Redditch. Pseudobulbs of *Calanthe* 'Bryan.' Some growing on and a few distributed to Fellows 1913.
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PIRIE, D. V., London. Seed of *Rhynchospermum japonicum*. Sown.
POLMAN-MOOY, Messrs., Haarlem, Holland. Tulips. For nomenclature trial.
PROFITTLICH, W., Twickenham. Roses. Planted in garden.
READ, H. A., Johannesburg, Transvaal. Colchicums. Planted in garden.
REID, Captain S. G., Yalding. Plants for rockery. Seed of *Campanula Rapunculus*. Sown.
REUSS, L., Woking. Seeds. Sown.
RIVERS, Messrs., Sawbridgeworth. Stocks for Apples.
ROBERTS, H. M., Tring. Step ladders. For trial.
ROBSON, H. S., Grand Cayman, West Indies. Orchids. Growing on.
ROGERS, R., Eastbourne. Plant for rockery.
ROOZEN, Messrs., Overveen, Holland. Tulips. For nomenclature trial.
ROSCOE, F. A., Royston. Tomato 'Primus.' See p. 412.
ROSCOE, Sir Henry, Leatherhead. Rhododendrons. Planted in garden.
ROWLANDS, Messrs., Liverpool. Tulips. For nomenclature trial.
RUIGROK, Messrs., Hillegom. Tulips. For nomenclature trial.
RUXTON, A. F., M.A., Ashtead. *Pinguicula grandiflora* (planted in garden); seed of *Meconopsis racemosa* (sown).
SANDARS, Mrs., Lincoln. Collection of seeds. Sown.
SANDEMAN, Col. J. C., Havant. Seeds. Sown.
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SAUNDERS, G. W., Chelmsford. *Pulmonaria angustifolia*. Planted on rockery.
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SEABROOK, Messrs., Chelmsford. Stocks for Apples.
SEATON, Miss, Ross. Saxifraga 'Ellinor Seaton.' Planted on rockery.
SEGERS, Messrs., Lisse, Holland. Tulips. For nomenclature trial.
SHARPE, Messrs., Sleaford. Peas (see p. 674); potato (see p. 702); turnips (see p. 707); Aquilegia (growing on).
SHEPPARD, Mrs., Chelmsford. Seeds of *Campanula Vidalii* (sown); plant from South America (growing on).
SHOESMITH, H., Woking. Dahlias. Planted in garden.
SIMPSON, Messrs., Birmingham. Antirrhinums. See p. 635.
SKELTON, R., Hullcar, British Columbia. Plants and seeds. Growing on.
SMITH, E., Eastbourne. Plants for rockery.
SMITH, J. W., J.P., Bushey Heath. Plant for garden.
SMITH, W. S., Goole. Plant raised from seed obtained from Canary Isles. Growing on.
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SPENCER, T., Ross. Cucumber 'Ne Plus Ultra.' To be grown 1914.
SPOONER, Messrs., Hounslow. Stocks for Apples.
SPRING, Messrs., London. Fish manure.
STARK, Messrs., Great Ryburgh. Kniphofias. Planted in garden.
STAWARD, R., Panshanger. Potato (see p. 702); strawberry (see p. 406); tomato (see p. 414); peas (see p. 674); violas (see p. 381).
STEPHENS, M., Ewhurst. Seed of *Primula japonica.* Sown.
STOKES, H. L., Rugeley. Seeds of *Myosotidium nobile album.* Sown.
SUTTON, Messrs., Reading. Peas (see p. 674); turnips (see p. 707); tomatos (see p. 407).
SYDENHAM, Messrs., Birmingham. Antirrhinums (see p. 635); Aquilegia (growing on); pea (see p. 674); potatos (see p. 702); tomatos (see p. 407); turnip (see p. 707).
TAYLOR, J., Shrewsbury. Turnip 'Taylor's Cream.' See p. 707.
TAYLOR, Mrs., Henley. Seed of *Chimonanthus fragrans.* Sown.
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THE LOCKSHEATH NURSERIES LTD., Southampton. Tomato 'Locksheath Marvel.' See p. 411.
THE THREE C's Co., Liverpool. Cloches. For trial.
THOMPSON, Mrs., Salisbury. Irises. Planted in garden.
TIDY, A., Cobham. Myosotis seedlings. Growing on.
TINNE, Miss, Liverpool. Clitoria seed. Sown.
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TRAHERNE, Captain, Strathaven. Aquilegias. Growing on.
TREVOR, W., St. Leonards. 'Swanyck' labels. For trial.
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TUCKER, S. W., Salisbury. Seed of Melon. To be tried 1914.
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TURNER, T. W., Chelsea. Fig trees. Added to collection.
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VAN MEERBEEK, Messrs., Hillegom, Holland. Tulips. For nomenclature trial.
VAN TIL, Messrs., Hillegom, Holland. Tulips. For nomenclature trial.
VAN TUBERGEN, C. G., Haarlem, Holland. Tulips. For nomenclature trial.
VAN WAVEREN, Messrs., Hillegom, Holland. Tulips. For nomenclature trial.
VEITCH, Messrs. J., Chelsea. Antirrhinums (see p. 635); peas (see p. 674); tomatos (see p. 407); turnips (see p. 707); Aquilegias (growing on); thirty Rhododendron 'Kate Waterer' (planted in garden); collection of cross grafted plants (growing on); and seeds of Pyrus (sown).
VEITCH, Messrs. R., Exeter. Grafts of Apple 'No-pip'; pear trees; turnips (see p. 707); potatos (see p. 702); tomatos (see p. 407); peas (see p. 674); Antirrhinums (see p. 635); miscellaneous vegetables (see p. 713); Aquilegias (growing on); miscellaneous flowers (see p. 665); and Irises (growing on).
VEITCH, Mrs., St. Leonards. Seeds of *Clianthus Dampieri* and *C. puniceus.* Sown.
VIENNA BOTANIC GARDEN. Collection of seeds. Plants raised for distribution.
VOSS, Messrs., Millwall. Arseniate of Lead, Phospho-Nicotyl paste, and cucumber spot fumigant. For trial.
WAKELY, C., Chelmsford. Cuttings of *Bryophyllum calycinum.*
WALLACE, Messrs., Colchester. Tulips. For nomenclature trial.
WALTERS, Messrs., Rugby. Patent garden stakes. For trial.
WARE, Messrs., Feltham. *Lewisia columbiana.* Planted on rockery.
WARGRAVE PLANT FARM LTD., London. Tulips. For nomenclature trial.
WATKINS & SIMPSON, Messrs., London. Antirrhinums. See p. 635.
WATSON, C., Peasmarsh. Potato 'Winder's Pride.' See p. 702.
WEBB, W. M., F.L.S., Hanwell. Nesting boxes. Used in garden.
WELCH, F. W., Bournemouth. Welch's patent combined tool. For trial.
WEST, C. E., London. 'Westmaline.' For trial.
WEST, Mrs., Isle of Wight. Iris. Growing on.
WHEADON, Messrs., Guernsey. Tulips. For nomenclature trial.

WHEELER, Messrs., Gloucester. Peas (see p. 674) ; tomatos (see p. 407).
WHITTON, J., Glasgow. Bamboos. Planted in garden.
WILKS, Rev. W., M.A., V.M.H., Shirley. Seeds of : Red Sunflower (see p. 665) ; *Anemone alpina sulphurea* (sown) ; *Dryas Drummondii* (sown) ; *Euonymus europaeus latifolius*, *Cistus ladaniferus*, pink Helianthemum (sown).
WILLIAMS, J. C., Launceston. Various plants for garden.
WILLIAMS, Mrs., Wimbledon. Books for Library.
WILLMOTT, Miss, F.L.S., V.M.H., Great Warley. Collection of seeds. Plants raised for distribution.
WILSON, Miss, Weybridge. Books for Library.
WOOD, A. H., West Clandon. Copies of 'Journal' for Library.
WOOD, J. M., A.L.S., Durban, Natal. Bulbs of *Cyrtanthus* and *Scilla*. Planted in garden.
WOOD, W., Dartford. Tomato 'Dartford Heath Comet.' See p. 408.
WOODHOUSE, Dr., Esher. *Iris bracteata*, *I. ruthenica*. Planted on rockery.
YOKOHAMA NURSERY Co., London. Corms of Gladiolus 'Peace' (see p. 665) ; collection of seeds (sown).
YOUNG, Messrs., Cheltenham. Carnations. Growing on.

NOTES ON RECENT RESEARCH

AND

SHORT ABSTRACTS FROM CURRENT PERIODICAL LITERATURE, BRITISH AND FOREIGN,

AFFECTING

HORTICULTURE & HORTICULTURAL SCIENCE.

THE endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural periodical literature, has met with much appreciation. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

There are still, we feel, some departments of Horticulture and Horticultural Science very imperfectly represented in these abstracts, and the Editor would be grateful if any who have time at command, and who are willing to help in any special direction in this work, would communicate with him. He desires to express his most grateful thanks to all who co-operate in the work, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* renders subsequent reference to the original easy. The order agreed on is as follows:—

1. To place first the name of the plant, disease, pest, &c., being noticed; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal, &c., in which the original article appears, taking care to use the abbreviation which will be found on pp. 453, 454.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP IN THIS WORK.

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Whittles, W., F.R.H.S.
Williams, S. E., F.R.H.S.
Wilson, Gurney, F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Beiheft zum Botanischen Centralblatt	Beih. Bot. Cent.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Bollettino della R. Società Toscana d' Orticultura	Boll. R. Soc. Tosc. Ort.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from U.S.A. Herbarium	Contr. fr. U.S.A. Herb.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr.W.
Journal of Agricultural Science	Jour. Agr. Sci.
Journal of Botany	Jour. Bot.
Journal of Chemical Society	Jour. Chem. Soc.
Journal of Economic Biology	Jour. Econ. Biol.
Journal of Economic Entomology	Jour. Econ. Entom.
Journal of Genetics	Jour. Gen.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal of the Society of Chemical Industry	Jour. Soc. Chem. Ind.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
La Pomologie Française	Pom. Franç.
Le Jardin	Le Jard.

Lebensgeschichte der Blütenpflanzen Mitteleuropas	Lebens. d. Blütenpfl.
Mycologia	Mycologia.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.
Oesterreichische Garten-Zeitung	Oester. Gart. Zeit.
Orchid Review	Orch. Rev.
Orchis	Orchis.
Phytopathology	Phytopathology.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Quarterly Journal of Forestry	Quart. Jour. of Forestry.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
Transactions Royal Scot. Arboricultural Soc.	Trans. Roy. Scot. Arbor. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.
† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Agathis vitiensis (*Bot. Mag.* tab. 8512).—Family *Coniferae*, tribe *Araucarieae*. Fiji Islands. Tree, resiniferous, 80–100 feet in height. Leaves subopposite, 3½–5 inches long. Catkins 1¼ inches long. Cones globose, 3¼ inches long, 3½ inches wide. Seeds solitary with membranous, unequal-sided wing.—*G. H.*

Alder Blight Aphis, The Life History of the. By Theo Pergande (*U.S.A. Dep. Agr., Bur. Entom., Tech. Ser.* No. 24; April 1912; 12 figs.).—In perhaps no other group of insects is a thorough knowledge of the life histories so necessary to correct conceptions of the species as in the family Aphididae. It is a well-known fact that many aphides have a secondary or alternate food plant. A notable example of this is the hop aphis (*Phorodon humuli* Schrank), which lays its eggs and passes the winter on the plum, and which is best combated by spraying the cultivated and destroying the wild plums in the vicinity at the seasons of the year when the aphis is present on this food plant rather than by measures directed against the insect during the summer when it occurs on the hop-vines. Investigations by the writer of the present species, which has hitherto been confused under various names, were begun in 1878, and have been continued up to 1911. They have resulted in straightening out the synonymy of the species and furnished conclusive proof that *Pemphigus acerifolii* of Riley described from the maple, and *P.* (*Eriosoma*) *tessellatus* of Fitch, described from the alder, are merely forms or series of one and the same species which should now be known as *Prociphilus tessellatus* Fitch.—*V. G. J.*

Alocasia Micholitziana (*Bot. Mag.* tab. 8522).—Family *Aroideae*; tribe *Colocasiae*. Philippines. Herb. Stock 1½ foot high. Leaves sagittate, dark green above, paler ribs, anterior lobes 4–10 inches long; peduncle 4–6 inches long, green but banded with brownish-purple markings. Spathe erect, subglobose; lamina 3½–4 inches long, pale yellowish. Spadix, appendix pale yellowish. Ovary globose.
G. H.

Apple 'Cornell' (*U.S.A. Dep. Agr., Year Book* 1911, p. 423; col. plate).—A variety raised some 100 years ago and now recommended for early market use.—*E. A. Bd.*

Apple 'Eastman' (*U.S.A. Dep. Agr., Year Book* 1912, p. 262; col. plate).—Raised from 'Fameuse' in 1874, and much hardier than this variety and extremely prolific.—*E. A. Bd.*

Apple 'Monocacy' (*U.S.A. Dep. Agr., Year Book* 1912, p. 263; col. plate).—A variety which originated about 1849. A late sort which is valuable for all purposes: heavy and regular bearer.—*E.A.Bd.*

Apple, Insect and Fungous Enemies of the Fruit and Foliage of the, The more Important. By A. L. Quaintance and W. M. Scott (*U.S.A. Dep. Agr., Farm. Bull.* 492; April 1912; 21 figs.).—This paper furnishes fruit-growers with the necessary information for summer spraying, or spraying trees in foliage, as opposed to treatments during the dormant period of the trees.—*V. G. J.*

Apple Orchard Design. By E. G. Edgell (*Agr. Gaz. N.S.W.* vol. xxiv. pt. vii. pp. 615–625; 4 figs.).—The triangular system of laying out an orchard is the best. If the trees are placed 24 feet apart, 87 trees an acre can be planted, compared with 75 in squares. On undulating ground the furrows can be taken in nearly level contours instead of up and down the slopes.—*S. E. W.*

Apple Orchards, Fertilization in. By J. P. Stewart (*U.S.A. Hort. Soc., Virginia, Rep.* 1912, pp. 159–192).—It is held that colour in apples cannot be materially increased by fertilizer applications, and that the red colours of apples are essentially dependent upon maturity and sunlight, any conditions which tend to increase one or both of these factors increasing the colour also. The apparent injury to colour by nitrates is considered to be owing to delayed maturity, and to lessened sunlight as a result of the increased density of foliage. An experiment was made to determine the truth of this by leaving the fruit on some nitrate plots until it had reached approximately the same degree of maturity as that attained by the fruit on the check plots at gathering-time. The delay required was fully three weeks, and by that time the colour on the nitrate plots was actually 10 per cent. greater than that on the check plots at their picking-time (p. 174). It is recommended that nitrate should not be applied earlier than petal-fall, nor later than mid-July.

The paper gives a comprehensive survey of the application of fertilizers to apple orchards and its results.—*A. P.*

Apples, 'Prince Alfred' and 'Scarlet Nonpareil' (*Agr. Gaz. N.S.W.* vol. xxiv. pt. viii. p. 692; 1 col. plate).—Coloured pictures of these two apples are given. 'Prince Alfred,' imported from Tasmania, is a mid-season apple, with a yellow skin striped red. The flesh is yellowish white, juicy and rich in flavour.—*S. E. W.*

Apple 'San Jacinto' (*U.S.A. Dep. Agr., Year Book* 1911, p. 425; col. plate).—A new variety resembling the 'Red June,' but later—July to August. Well adapted to southern latitudes.—*E. A. Bd.*

Apple Scab on Young Shoots, Is it a Source of Spring Infection? By W. J. Morse and W. H. Darrow (*Phytopathology*, vol. iii. pp. 265–269).—The authors examine the literature dealing with the question

of the over-wintering of the apple-scab fungus (*Venturia pomi* = *Fusicladium dendriticum*) on the shoots of apple. They investigated the matter on the trees in Maine and found the spores from the affected shoots quite capable of germination in April, but did not quite satisfactorily prove that these spores had lived over the winter.—*F. J. C.*

Apple 'Shiawassee' (*U.S.A. Dep. Agr., Year Book* 1911, p. 426; col. plate).—A variety of the 'Fameuse' group, October to January, as hardy as the type but less subject to scab. Valued as a pollenizer for the 'McIntosh Red.'—*E. A. Bd.*

Apple 'Summer King' (*U.S.A. Dep. Agr., Year Book* 1912, p. 266; col. plate).—An August variety of some 100 years of age, notable for high flavour and good appearance.—*E. A. Bd.*

Apple Tree Anthracnose, or Blackspot Canker. By W. H. Lawrence (*U.S.A. St. Bd. Hort., Oregon, Rep.* 1911–12, pp. 93–97).—There are two spore forms developed in each canker, the conidial maturing the first year and the ascigerous the second, and though it has not been determined which form is the more active agent in distribution, it is held that both play their part and are jointly effective in the continuation of the disease on infested trees, and the spread to the bodies and fruits of other apple trees, the fruits of the quince, and the trunk and limbs of the prune, plum, pear, and cherry. The most surprising of recent investigations is the occurrence of the disease on stored fruit from orchards in which anthracnose canker has not occurred, spores apparently lodging on the fruit some days before the apple harvest. As this causes rotting when in store, it is recommended to spray infested trees with a weak Bordeaux mixture (4–4–50) before gathering the fruit, in order to kill the spores adhering, the deposit on the skin being removed by wiping just before packing. A spraying with a stronger Bordeaux mixture (6–4–50) should follow as soon as the fruit is gathered, and yet another two or three weeks later. As the disease develops after storage, the spores infecting fruit previously sound, it is worth while spraying perfectly clear trees if there are infected trees in the neighbourhood.—*A. P.*

Apple Trees and Cedar Rust. By H. S. Reed (*U.S.A. Hort. Soc., Virginia, Rep.* 1912, pp. 218–228).—The financial loss caused by this disease in 1912 in this State alone is estimated at $500,000, without taking into account the weakened condition of the trees affected, and a laboratory has been established for the study of it, this paper giving the results of two years' investigations into its life-history and the best means of controlling it. The cedar rust is a fungous disease, and the organism requires both the red cedar and the cultivated apple to complete its life-cycle, which is here fully described. Some methods of spray treatment are detailed which

have been effective in controlling the disease, though they have not cured it. The destruction of all red cedar trees within half a mile of the orchards would give satisfactory results, but a mile would be better, as the wind may carry the spores a long distance.

See also an article on "Cedar Rust" in 1913 *Trans. Peninsula Hort. Soc.*, pp. 37–40.—*A. P.*

Apples, Bitter Pit in. By Dr. Alfred J. Ewart (*Agr. Jour. Cape G H.*, vol. iv. No. 4, October 1912, pp. 631–633).—Results obtained, according to Dr. Ewart, "conclusively show that the 'disease' of apples known as bitter pit is, strictly speaking, not a 'disease' at all, but is a symptom of local poisoning." Bitter Pit is hard to combat because it has been proved to occur in 90 per cent. of sprayed and in only 10 per cent. or less of unsprayed orchards. The difficulty is to find a substance which will diminish the toxicity of spray poisons to plants, while leaving them equally effective against the insect pests which eat and digest the poisonous spray with the plant tissues. Lime and citric acid are such substances, but much more effective ones may be found. Two other points emerge as established facts, viz. "that more than one poison may produce Bitter Pit; that such poisons may be derived from more than one source."—*A. A. K.*

Apples, Bitter Pit in. By D. McAlpine (*Jour. Agr. Vict.* May 1913, p. 305). Neither insects nor fungi, bacteria nor external agencies, such as spraying, are concerned in the production of Bitter Pit. The cause rather is internal, and must be sought for in a study of the structure and physiological processes of the Apple itself. A record of the work done in this sphere forms a large part of the report. The principal contributing factors to the disease are—(1) changeable weather conditions at a critical period of growth, (2) amount and rapidity of transpiration by the Apple, (3) sudden checking of transpiration at night, (4) failure of water supplies under the skin of the fruit followed by irregular recovery, (5) inequality of growth, (6) fluctuations of temperature during storage, (7) nature of the variety. These factors are more or less susceptible of control by approved methods of cultivation, selection, and storage, and further work of a practical character is outlined for next season in determining the effect of soil, cultivation methods, manuring, irrigation, selection of stocks, and systems of pruning. The results of the next report will be awaited with interest. Incidentally it is noted that when Apples are kept at a temperature of 30° to 32° Fahr. the development of Bitter Pit is retarded.—*C. H. H.*

Apples, Old and New. By U. P. Hedrick and G. H. Howe (*U.S.A. Exp. Stn., New York, Bull.* 361, 135 pp.).—A discussion on various Apple questions, such as Strains, Degeneration, Disease resistance, followed by a catalogue of varieties tried in the experimental garden at Geneva, New York.—*E. A. Bd.*

Apples Recommended for Victoria, Australia (*Jour. Dep. Agr. Vict.* June 1913, pp. 388–389).—The recent Pomological Congress drew up the following list, placed in order of preference. For northern districts—(E.), early ; (M.), medium ; (L.), late ; (V.L.), very late—(1) Cleopatra (M.) ; (2) Dunn's Favourite (M.) (syn. Munroe's Favourite) ; (3) Jonathan, Gravenstein (M.) ; (4) Rome Beauty (L.) ; (5) Esopus Spitzenberg (L.M.), Cox's Orange Pippin (M.) (in special districts), London Pippin (M.) ; (6) Peasgood's Nonsuch (E.), Wealthy (M.), Steward's (L.), Shepherd's Perfection (M.), Scarlet Nonpareil (L.); (7) Stone Pippin (L.) ; (8) Rymer (L.), Schroeder (L.), Winter Strawberry (L.) ; (9) Rokewood (V.L.).

For southern districts.—*Apples* in order of preference. (1) Jonathan ; (2) Gravenstein ; (3) Yates ; (4) Rome Beauty ; (5) London Pippin ; (6) Shorland Pippin (E.), Reinette du Canada (M.) ; (7) Alexander, Wealthy (E.), Pomme de Neige (M.), Statesman (L.), Rokewood, Newman's Seedling (L.), Stone Pippin, Stewart's ; (8) Sturmer Pippin, Esopus Spitzenberg (L.), Lord Wolseley (L.), Green Alfriston (E.).

Pears.—(1) Williams (E.) ; (2) Beurré Bosc (M.), Winter Nélis (L.), Josephine de Malines (L.), Packham's Triumph (M.), Beurré d'Anjou (M.), Urbaniste (M.) ; (3) Conference (M.), Winter Cole (L.), Howell (M.), Madam Cole (L.), Glou Morceau (M.L.) ; (4) Kieffer (M.), Broompark (L.), Beurré Capiaumont (M.) ; (5) Vicar of Winkfield (M.L.).—*C. H. H.*

Asparagus Breeding for Rust Resistance. By J. B. Norton (*U.S.A. Dep. Agr., Bull.* 263, 60 pp. ; 18 plates).—The ravages of *Puccinia asparagi* having caused great damage in the United States, search was made for resistant varieties. 'Argenteuil' and 'Palmetto' were found to be amongst these, but not uniformly so. Resistance is considered to be based on structural differences. Two varieties have resulted which are considered commercially immune, and they are now being propagated in quantity.—*E. A. Bd.*

Avocado 'Pollock' (*U.S.A. Dep. Agr., Year Book* 1912, p. 272 ; col. plate).—A variety raised about 1896, of which the fruits are remarkable for their large size.—*E. A. Bd.*

Azalea 'Étoile de Belgique.' By Max Garnier (*Rev. Hort.* p. 402, Sept. 1, 1913 ; plate).—The plate represents a very fine *Azalea indica* named as above with magnificent large double flowers of a brilliant carmine red. Very fine indeed.—*C. T. D.*

Bananas, Ripening of (*U.S.A. Dep. Agr., Year Book* 1912, pp. 293–308).—A record of experiments made with the respiration calorimeter, the heat liberated being a measure of the activity of ripening processes. No conclusions of practical value are drawn as the experiments are to be continued.—*E. A. Bd.*

Bean Thrips, The. By H. M. Russell (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 118; Oct. 1912; 11 figs.).—The common name "bean thrips" is somewhat of a misnomer, as this insect feeds on many different crops, including alfalfa and cotton. Spraying is useless for a crop such as alfalfa or cotton, and will probably only be successful with the bean when the vine can be reached from the under side.

V. G. J.

Beetles, Their Value as Parasitic Enemies of Insect Pests. By A. F. Burgess and C. W. Collins (*U.S.A. Dep. Agr., Year Book* 1911, 7 pp.; 1 col. plate and many figs.).—An interesting account of the many Beetles which prey upon pests of garden plants. The Ladybird (*Adalia bipunctata*) larvæ were noted to destroy some sixty aphides daily. The experiment of bringing the Asiatic ladybird (*Chilocorus similis*) to prey upon the St. José scale proved abortive, the parasite disappearing in a few years. The writers end on a hopeful note considering that much may be done in controlling pests by the encouragement and introduction of such carnivorous insects.—*E.A.Bd.*

Berberis, New Chinese Species of (*Gard. Chron.* Nov. 15, 1913, p. 335; with coloured plate and 2 figs.).—Sixteen species are described and *B. Sargentiana* specially recommended, as being the only evergreen Barberry that has proved perfectly hardy in the Arnold Arboretum.—*E. A. B.*

Birds and Grain Aphides (*U.S.A. Dep. Agr., Year Book* 1912, pp. 397–404; figs.).—An interesting account of the amount of aphides found in the stomachs of American birds. The Field Sparrow (*Spizella pusilla*) leads with a daily consumption of 154, closely followed by the Goldfinch (*Astragalinus bristis*) with 132·5.—*E. A. Bd.*

Birds, An Investigation concerning the Food of Certain. By J. Hammond (*Jour. Agr. Sci.* vol. iv. pp. 380–409; June 1912).—The relations of the starling and the lark to agriculture, but not to fruit-growing, were investigated in Norfolk, Essex, and Cambridge during the whole course of the year. The starling was found to devour an enormous number of insects of all kinds, both harmful and beneficial, during late spring, summer, and early autumn, but did considerable damage to grain (especially seed wheat) in autumn and some in spring. The contents of the gizzards &c. of 239 starlings were examined. Larks, on the whole, are beneficial, devouring vast quantities of weed seeds and insects, but in winter and seed-time doing some damage to green crops and small seeds.—*F. J. C.*

Birds Insectivorous of New South Wales (cont.) (*Agr. Gaz. N.S.W.* vol. xxiv. pt. v. pp. 388–389; 2 col. figs.).—The Orange-winged Tree Runner (*Neositta chrysoptera*) has a grey back with brown streaks and a bright orange patch on each wing.

The Fantailed Cuckoo (*Cacomantis flabelliformis*) lays its eggs in the nests of other insectivorous birds.—*S. E. W.*

Black Knot, Biologic Forms of. By E. M. Gilbert (*Phytopathology*, vol. iii. pp. 246–247, Aug. 1913).—Black Knot (*Plowrightia morbosa*) attacks *Prunus virginiana* and *P. americana* very commonly, and *P. pennsylvanica* and *P. serotina* rarely. Plums and cherries, even in the vicinity of badly diseased shrubs, are however not attacked in Wisconsin. Cross infections with active spores of the fungus from these different trees were unable to cause the production of typical Black Knot, and it is therefore considered that *Plowrightia morbosa*, like many other fungi, has several biologic forms.—*F. J. C.*

Blue Gum in California, Yield and Returns of. By T. D. Woodbury (*U.S.A. Dep. Agr., Forest Service, Circ.* 210, November 8, 1912).—On account of its value from a purely commercial point of view the cultivation of Eucalyptus—particularly the blue gum tree (*E. Globulus*)—is receiving at present an increased amount of attention. When properly cared for in the matter of thinning, the yield from Eucalyptus plantations is very high, being probably only exceeded in that way by the Redwood and Pacific coast Douglas Fir.—*A. D. W.*

Bolleo-Chondrorhyncha × Froebeliana Cogniaux. By E. Miethe (*Orchis*, vol. vii. pt. vi. pp. 86–88; 2 figs.).—This natural hybrid is not an improvement on its parents. The flowers are yellowish white suffused with blue.—*S. E. W.*

Boring Insects. By A. J. Cook (*U.S.A. St. Com. Hort. Cal., Bull.* March 1912, vol. i. No. 4; 28 figs.).—Although there are five orders of insects furnishing borers, the most destructive belong to the Lepidoptera.

The Californian Peach Borer (*Sanninoidea opalescens* Hy. Edw.) is a very serious pest of all stone fruits. It is thought to work less damage to trees on Myrobalan stock, and is more serious if trees are injured, sickly, or grown in sandy soil. Except for its colour, this insect is very similar to the Eastern peach borer (*S. exitiosa*); both are beautiful wasp-like moths. The eggs are deposited on the trunk of the trees near the earth. The larvæ hatch in about two weeks and commence feeding at once and eat into the cambium layer. Washes and sprays are not reliable, the only method of control seems to be digging out the larvæ.—*V. G. J.*

Bougainvillaea lateritia. By Dr. Georges V. Perez (*Rev. Hort.* pp. 376–377, Aug. 16, 1913; plate).—The photograph in natural colours represents a truly gorgeous mass of bloom yielded by this plant in the open in the Canaries. Dark brick-red in colour, it has spread luxuriantly over an adjoining group of Yuccas &c., and is stated to flower throughout the year. A cherry-red variety of it is stated to be even more beautiful.—*C. T. D.*

Breeding of Plants (*U.S.A. Dep. Agr., Year Book* 1911, p. 409).—Suggestions for breeding new and hardier races of plants from the introductions recently received from Northern China and elsewhere. A few portraits of wild apples &c. in native habitats.—*E. A. Bd.*

Broad-bean Weevil, The. By F. H. Chittenden, Sc.D. (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 96, pt. v.; August 1912; 20 figs.).—This weevil (*Laria rufimana*, Boh.) is known in Europe as the bean beetle or bean-seed beetle. It especially infests broad beans, and, it is said, peas, and some other legumes.

Soaking the seed fifteen minutes in water of a temp. of 140° F. before sowing the seed appears to be a good remedy. Also fumigation with bisulphide of carbon, at the rate of 2 or 3 lb. of the chemical to each 1000 cubic feet of air space for forty-eight hours.—*V. G. J.*

Brown-rot Fungus (Zur Kenntnis der durch Monilia-Pilze hervorgerufenen Blüten- und Zweigdürre unserer Obstbäume). By Prof. Eriksson (*Mycol. Centralbl.* vol. ii. pp. 65–78, 1913; figs.).—The author describes the attack of this fungus, *Monilia fructigena*, upon apples and cherries, both on the flower and the shoots. It passes the winter on the latter and commences the attack upon the flowers through spores from the spore groups which burst through the bark. The author recommends spraying in spring and summer with 2 per cent. Bordeaux mixture, the destruction of all mummy fruits, and the pruning out of the diseased shoots.—*F. J. C.*

Bulbs, Flowering, Culture of, by the United States Board of Agriculture. By F. F. Matenaers (*Die Gart.* Feb. 1, p. 67).—On account of the great increase in the import of Dutch bulbs, the Board of Agriculture in the U.S.A. determined to make an attempt to grow them in their own land. For this purpose a 10-acre piece of land was acquired on Puget Sound, near Bellingham, Washington. In the year 1908 170,000 bulbs were planted out, the number for planting out increasing each consecutive year, reaching its maximum last year of 869,000. The Board's officials concerned with this maintain that they succeeded in growing bulbs quite as good as those of Holland, if not better. To prove this, two rows of 50 of the same variety of respectively American and Dutch grown bulbs were planted out. The American bulbs bloomed from seven to ten days earlier, were superior in size, colour, and quality of flower, and remained absolutely free from disease, whilst those imported were inclined to be sickly and a considerable number of the same failed to bloom at all. The two drawbacks lie in the higher cost of producing and transport to New York. With the completion of the Panama Canal they will be enabled to transport to New York from the West Coast at less cost than from Europe, and the cost of producing could be minimized by the use of suitable machines.—*G. R.*

Cabbage Web-worm, The Imported. By F. H. Chittenden, Sc.D., and H. O. Marsh (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 109, pt. iii.; April 1912; 4 figs.).—The cabbage web-worm (*Heliula undalis* Fab.) appears to attack all cruciferous plants. The larva of a small grey moth, it begins work by first spinning a web in which

to retreat, and then proceeds to eat out the "buds" of the young plants in addition to devouring the leaflets.

Bordeaux mixture sprayed on the plants when they are first set out, or when they first appear above ground, and continued at intervals of a week or two, should act as a deterrent.

When cabbage and similar plants are set out they should first be dipped in a solution of arseniate of lead, 4 lb. to 50 gallons of water.

V. G. J.

Cactus, Echinopsis × Rohlandii Foerster. By Roland Gosselin (*Rev. Hort.* p. 304, July 1, 1913; plate).—The illustration depicts a Cactus of the Cereus type bearing large and very beautiful light mauve flowers some 3 inches in diameter as the result of crossing *Echinopsis tubiflora* with the pollen of *E. oxygona*. Some Mendelian data are given concerning other results of crossing.—*C. T. D.*

Camellia 'Fred Sander.' By Max Garnier (*Rev. Hort.* p. 476, Oct. 16, 1913; plate).—The plate depicts a very beautiful rich crimson Camellia with very large semi-double flowers, with prettily fimbriated petals. Very handsome.—*C. T. D.*

Capoc Trees of Togo. By E. Ulbrich (*Not. König. Bot. Berlin*, vol. vi. No. 52, pp. 39–65, September 1913; with 2 text figures).—The present communication consists of the report of the replies received from the principal capoc-growing districts to a circular note of queries which was issued by the Colonial Department of the Dahlem Botanical Gardens in 1911.

The most important outcome of this inquiry is the establishment of the fact that two well-defined forms (or rather, series of forms) of cotton-wool-yielding trees of *Ceiba pentandra* (L.) Gaertn., occur in Togo. Typical examples of each are readily distinguished, but a complete series of intermediate forms occur between them. The two forms of *Ceiba pentandra* are:

(a) *Spinous Capoc-yielding trees.* This form grows as a large tree with strongly developed basal roots, dark-green leaves, fruits which burst upon the tree, and spinous branches with a spreading habit.

(b) *Non-Spinous Capoc-yielding trees.* This type of tree is usually lower in height, has only slightly developed basal roots, light-green leaves which are narrower than those of type (a), fruits which fall to the ground unopened, and the spineless branches are more erect and less spreading than in the preceding form.

The spineless Capoc trees possess all the qualities necessary for successful culture of the wool. They are not too tall, they do not shed the wool before the fruits fall to the ground, and they have no basal roots or spines to interfere with gathering the fruits.

This form of tree, however, requires a more fertile soil for its growth than does the spinous type.

The present article concludes with a description of four cotton-wool yielding species of *Bombax* which grow wild in Togo.—*R. B.*

Carbonic Acid as Food for Plants. By E. Winter (*Gartenflora*, vol. lxii. pt. xviii. pp. 402–404).—Excellent results have been obtained by the addition of carbonic acid to the atmosphere of an orchid-house, every sunny day from autumn to May. The gas was generated in the usual way by the action of hydrochloric acid on dilute marble. The greenhouse windows and doors must of course be closed during the operation and for some time after.—*S. E. W.*

Catalpas and their Allies. By H. Garman (*Kentucky Agr. Exp. Stn., Bull.* 164, February 15, 1912).—That the Catalpa is a valuable forest tree and the timber well suited for using in alternates of drought and damp is not sufficiently recognized. The differences between *Catalpa speciosa* and the better known, in this country at least, *C. bignonioides* are here clearly set forth, and some excellent illustrations help greatly to elucidate the text.—*A. D. W.*

Catasetum microglossum (*Bot. Mag.* tab. 8514).—Family *Orchideae*, tribe *Vandeae*. Peru. Herb, epiphytic. Leaves elliptic-oblong, 8–11 inches long. Flowers dull purple, with linear sepals, 1 inch long.—*G. H.*

Cattleya Mossiae var. Beyrodtiana. By R. Schlechter (*Orchis*, vol. vii. pt. v. p. 68; 1 plate).—A consignment of *Cattleya Mossiae* from Venezuela contained one plant, which resembled the others in growth but exhibited a marked difference in inflorescence, as can be seen by the plate. The petals are only slightly curved and their edges are not waved. The front of the labellum is oval with a perfectly smooth edge. The petals and sepals are pale rosy red, and the labellum is dark red with dark spots and golden streaks.—*S. E. W.*

Cauliflower and Brussels Sprouts on Long Island. By L. B. Judson (*U.S.A. Exp. Stn., Cornell, Bull.* 292; March 1911; 27 figs.).—A report and description of the methods in use on Long Island for the successful culture of cauliflower and sprouts. Remarkable and profitable crops are obtained, as much as $2000.00 being realized from four acres of cauliflower outside of freight and commission.

The soil is a light sandy loam, somewhat deficient in humus. The ground is ploughed in early spring, some sort of cover crop and occasionally manure being turned under; it is then left till July or planted with early potatos, which are lifted by August 1. Potatos are usually chosen to follow as well as precede cauliflowers, although carrots are sometimes used instead.

The importance of good seed cannot be over-emphasized, badly selected strains inevitably produce leafy loose heads. Two to three ounces an acre are sown, and the variety 'Dwarf Erfurt' grown almost exclusively, this being a medium-sized plant producing a large, solid, symmetrical head.

It is usual to protect the heads from sun and rain by tying some of the leaves over them.

The crop is subject to the attacks of all the usual Brassica pests and diseases, and the author describes the remedies and preventive measures in vogue. Hellebore and Pyrethrum powders are found to be more effective than liquid sprays for combating caterpillars, and the former mixed with water at the rate of 2 oz. to the gallon has proved a perfect remedy for the cabbage maggot (*Pegomyia brassicae*, Bouché) when applied to the soil at the base of the plants.—*V. G. J.*

Celery Blight (Septoria Petroselini var. Apii). By E. S. Salmon (*Gard. Chron.* June 21, 1913, p. 414; 1 fig.). Description of appearance, history of, in this country, and recommendation of spraying with Bordeaux mixture in June, July, and August, or dipping young plants in it when planting.—*E. A. B.*

Celery, Cultivation of. By E. Beckett (*Jour. Bd. Agr.*, vol. xx. No. 9, pp. 793–796).—The cultivation of Celery as practised in private gardens is described.—*A. S.*

Centaurea crassifolia (*Bot. Mag.* tab. 8508).—Family *Compositae*, tribe *Cynaroideae*. Malta. Under-shrub, 2 feet high. Leaves long, spathulate, fleshy. Heads ternate–quaternate 2 inches wide on long branches. Flowers purple, rarely rosy or white.—*G. H.*

Chalcidoid Genus Perilampus and its Relations to the Problem of Parasitic Introduction, The. By Harry S. Smith (*U.S.A. Dep. Agr., Bur. Entom., Tech. Ser.* No. 19, pt. iv.; April 1912; 8 figs.).—Practical utilization of parasites in the control of noxious insects is becoming a more and more important means of warfare in economic entomology. This paper deals principally with the biology of *Perilampus hyalinus*.—*V. G. J.*

Cheiranthus × Mutallio. By D. Bois and G. T. Grignan (*Rev. Hort.* p. 318, July 16, 1913).—Report on results of crossing *Erysimum Allioni* with *Cheiranthus mutabilis* by Messrs. Cayeux and Le Clerc, the second generation producing plants of different habit, and larger flowers than *E. Allioni*, with a large proportion showing the red colour derived from *C. mutabilis*.—*C. T. D.*

Chestnut (Castanea) Bark Disease (*U.S.A. Dep. Agr. Year Book*, 1912, pp. 363–372; 1 col. plate and many figs.).—A detailed discussion of the damage caused by *Endothia parasitica* (Murr.), and its cure and prevention. The ascospores are wind and animal carried, and enter through a wound, and possibly even when the bark is uninjured. American chestnuts and cultivated varieties of the European are susceptible; Asiatic species resist to some extent.—*E. A. Bd.*

Cider Sickness. By B. T. P. Barker and V. F. Hillier (*Jour. Agr. Sci.* v. pp. 67–85; Oct. 1912).—The authors discuss the widespread trouble in cider-making called "cider sickness." This they

find to be due to a bacterium which they promise to describe in a subsequent paper. Washing the fruit with water before crushing, scrupulous cleanliness in utensils, &c., fermentation to dryness where this is possible, the raising of the acidity of the cider by suitable blending, storage at a low temperature, and the bottling of the cider in January or February instead of in April or May, are recommended as means of prevention.—*F. J. C.*

Cirrhopetalum Mastersianum (*Bot. Mag.* tab. 8531).—Family *Orchidaceae*, tribe *Epidendreae*. Malaya. Herb, epiphytic. Leaves 5 inches long. Scape slender, 6 inches long. Umbels 6–8 flowered. Flowers yellow flushed with umber-brown. Lip 1½ inch long, recurved.—*G. H.*

Citrus Groves; Sites, Soils, and Varieties for, in the Gulf States. By P. H. Rolfs (*U.S.A. Dep. Agr., Farmers' Bull.* 538, May 16, 1913).—Owing to the numerous requests which have been received by the Department of Agriculture for information regarding the growth of oranges and other Citrus fruits in Florida, we get the present useful bulletin. The publication is divided into three parts: (1) Sites, soils, and varieties for Citrus groves in the Gulf States; (2) propagation of Citrus trees in the Gulf States; and (3) culture, fertilization, and frost protection of Citrus groves in the Gulf States.—*A. D. W.*

Citrus Trees, Propagation of, in the Gulf States. By P. H. Rolfs (*U.S.A. Dep. Agr., Farmers' Bull.* 539, June 21, 1913).—This is a résumé of the various operations carried out in the cultivation of Citrus trees—nursery management, selecting seeds, preparation of seed beds, sowing, and transplanting.—*A. D. W.*

Clavija grandis, DC. By H. Harms (*Gartenflora*, vol. lxi. pt. xix. pp. 416–418; 1 col. plate).—*Clavija grandis* bears, on the end of a long, slender stem, a crown of lance-shaped leaves, about three feet in length. The small dark-red flowers form grape-like clusters. The plant is dicœcious.—*S. E. W.*

Clematis montana var. Wilsonii. By S. Mottet (*Rev. Hort.* pp. 322–324, July 16, 1913; 1 ill.).—A description of this and other Chinese introductions by Mr. E. H. Wilson. The flowers of this variety are larger than those of *C. m. grandiflora*, are more massed, and produced later, *i.e.* summer rather than spring, and sometimes also in the autumn. Foliage more ample and with goffered edges, giving an altogether different aspect from *C. m. grandiflora*. It is pointed out that some of the former introduced would appear by these differences to justify specific rather than varietal rank. Highly recommended for cultivation.—*C. T. D.*

Coccidae, Catalogue of Recently Described. By E. R. Sasscer (*U.S.A. Dep. Agr., Bur. Entom., Tech. Ser.* No. 16, pt. vi.; Oct. 1912).—Since the publication of part iv., 6 new genera, 110

new species, and 4 new varieties have been described in various publications by workers on Coccidae. This makes a total of 29 new genera, 9 new sub-genera, 540 new species, and 45 new varieties recorded since the appearance of Mrs. Fernald's catalogue in 1903. The writer believes this list to be fairly complete to March 1912.—*V. G. J.*

Codling Moth (*Jour. Econ. Entom.* vol. v. pp. 147-169, April (1912). —Two papers concerning the codling moth and its treatment appear in this journal, the first dealing with the effect of vigorous spraying as opposed to the usual light spray, and upholding the greater efficiency of this method; the second showing that one thorough spraying with lead arseniate within ten days after the fall of the petals will result in over 90 per cent. of the apples being clean, a further small number being protected by spraying again three weeks later. The importance of the early spraying before the closing of the calyx cup is brought out in both papers. This moth appears to be far more abundant in America than it is in this country.—*F. J. C.*

Codling Moth and its Bird Enemies (*U.S.A. Dep. Agr. Year Book*, 1911, p. 236).—The loss from ravages of the codling moth is estimated to reach twelve million dollars. The birds which are known to prey upon the larvæ are discussed, and among them we note the English sparrow. The importation of the great titmouse (*Parus major*) has been suggested, amongst other European natives, but the dangers of such introductions have prevented the experiment being attempted.—*E. A. Bd.*

Codling Moth in Michigan, Life-History Studies of the. By A. G. Hammar (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 115; Aug. 1912; 3 plates, 22 figs.).—The life of the codling moth and its larvæ are very variable under certain weather and other conditions. Variation in size is particularly to be noticed. The adaptability of the insect to remain dormant for a whole season and to transform subsequently the third season may possibly occur more frequently than has been actually observed. Such an adaptation would be of particular advantage to the species in surviving adverse seasons.

The writer has observed on several occasions that the larvæ in confinement will turn cannibal. He has also noticed that they will eat the leaves of the apple trees. It may thus be suspected that in cases of total crop failures the insect can subsist on foliage in sufficient numbers for the perpetuation of the species.—*V. G. J.*

Codling Moth, Lime-sulphur Wash an Efficient Ovicide for. By U. I. Safro (*Jour. Econ. Entom.* vol. v. pp. 385–395).—Reports of the lessening of codling moth after spraying with lime-sulphur led the author to study the effect of this spray upon the eggs of the moth. His observations lead him to conclude that lime-sulphur, even too strong for use on foliage and fruit, is, at best, an uncertain ovicide, and its effectiveness of doubtful value economically.—*F. J. C.*

Copper Fungicides. By S. U. Pickering, F.R.S. (*Jour. Agr. Sci.* vol. iv. pp. 273-281).—The author returns to the question of the action of copper compounds as fungicides, and shows that Messrs. Barker and Gimingham in some of their experiments overlooked the small quantity of copper which occurs in solution which was not found by the potassium ferrocyanide test. They, as has been pointed out in former abstracts, considered the solution of the copper compound was brought about by the action of some substance excreted by the fungus, but their failure to take into consideration the minute quantity of copper already in solution leads the present author to regard their conclusions as invalid, and to sustain his theory that the solution of the copper compound in spray mixtures is the result of the action of carbon-dioxide upon it. Lime is itself a fungicide, and has, no doubt, considerable value as such in ordinary Bordeaux mixture.—*F. J. C.*

Combretaceae, S. African. By R. A. Dümmer (*Gard. Chron.* Jan. 25, 1913, p. 52, continued in eight later numbers and concluded April 12).—An exhaustive monograph of the S. African species, with key to genera on p. 53, and to the species of *Combretum*, p. 67. The genera *Combretum*, *Terminalia*, *Pteleopsis*, and *Quisqualis* are dealt with.—*E. A. B.*

Connecticut, Report of, Agr. Exp. Stn. By Walter O. Filley (1912 ; illustrated).—This is part six of the above report and contains a vast amount of useful information, not only with reference to organization of the Connecticut Agricultural Experiment Station, but forest planting in Connecticut, with numerous illustrations of various objects connected with the life of the forester.—*A. D. W.*

Coriaria terminalis (*Bot. Mag.* tab. 8525).—Family *Coriaceae.* China, Tibet, and Sikkim. Undershrub, 1–4 feet high. Leaves opposite $1\frac{2}{3}$ inch long, $1\frac{1}{4}$ inch broad. Racemes many-flowered, 6 inches long. Petals 5, fleshy, accrescent, orange.—*G. H.*

Corokia virgata (*Bot. Mag.* tab. 8466).—New Zealand. Family *Cornaceae*, tribe *Corneae.* Shrub, 8 feet high. Leaves oblong-spathulate, $1\frac{3}{4}$ inch long. Flowers in 3-flowered racemes. Petals yellow.—*G. H.*

Cowpea Weevil, The. By F. H. Chittenden, Sc.D. (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 96, pt. iv. ; Oct. 1912 ; 1 plate, 1 fig.).—The seeds of cowpeas are subject to the attack of several species of beetles, of which the cowpea weevil (*Pachymerus chinensis* L.) and the four-spotted bean weevil (*P. quadrimaculatus* Fab.) appear to be specific enemies, injuring the seed in the same manner as the common bean beetle. They begin operations in the field, and continue to breed for successive generations in the stored seed until they entirely spoil it for food and seriously impair its germinating power. Bisulphide of carbon and hydrocyanic gas fumigation are the best methods of control.—*V. G. J.*

Cranberry Cultivation and Weather Reports (*U.S.A. Dep. Agr. Year Book*, 1911, p. 211).—An account of the relations of the meteorological office and the large Cranberry industry carried on in New Jersey, Massachusetts, and other American States.

The industry has assumed large proportions, one bog of 250 acres being entirely planted with this fruit.—*E. A. Bd.*

Creosote, Quantity and Quality of, found in two treated Piles after long service. By E. Bateman (*U.S.A. Dep. Agr., Forest Service, Circ.* 199, May 22, 1912).—This is the result of analysis of the quantity and quality of creosote found in two treated piles after a long period of service. The piles had been thirty years in the waters of the Gulf of Mexico, and the experiments were made with the object of determining whether the difference in their durability could be accounted for by the amount of creosote in each wood.—*A. D. W.*

Cross-pollination of Fruit Trees (*Jour. Bd. Agr.* vol. xx. No. 7, pp. 612–613).—The Board's attention was drawn to an 18-acre orchard of Amber Heart Cherry, which, although planted some thirty years ago, had never borne a proper crop. Upon investigation it was found that the variety is self-sterile.—*A. S.*

Crossties, Prolonging the Life of. By Howard F. Weiss (*U.S.A. Dep. Agr., Forest Service, Bull.* 118, November 9, 1912).—In prolonging the life of crossties the following points have been considered: (1) Treating the wood with chemical preservatives, (2) protecting the ties from mechanical wear, and (3) the use of sawn instead of hewn or split ties. The consumption of crossties in the United States railroads is considerable, and it is supposed that by paying attention to these matters great saving can be brought about.—*A. D. W.*

Crotalaria agatiflora (*Bot. Mag.* tab. 8505).—Family *Leguminosae*, tribe *Genisteae*. East Tropical Africa. Shrub 3 feet high. Leaves trifoliate; leaflets 1–2¾ inches long, ovate. Racemes, 8–14 inches long. Corolla very large, pale greenish-yellow. Standard 1½ inch long; keel long, acuminate; stamens, monadelphous below one-third of length.—*G. H.*

Crotalaria Species, A New, from German East Africa, dangerous to Cattle. By E. G. Baker, with a note on other poisonous East African Crotalarias by H. Harms (*Not. König. Bot. Berlin*, vol. vi., No. 52, pp. 66–69, September 1913).—This article gives the Latin description of the distinguishing characters of the new species, *Crotalaria Zimmermannii*. The records of other poisonous species from East Africa, as well as from other parts of the world, are called attention to by Harms. In German East Africa there are at least three distinct poisonous species, viz. *C. Zimmermannii*, *C. Quartiniana*, and *C. polysperma*.—*R. B.*

Cunonia capensis (*Bot. Mag.* tab. 8504).—Family *Saxifragaceae*, tribe *Cunoniae*. South Africa. Tree, evergreen, 12–15 feet high in conservatories; 50 feet in wild state. Leaves opposite, to 9 inches long. Flowers in dense racemes. Corolla yellowish.—*G. H.*

Cuttings, Incised. By Jules Rudolph (*Rev. Hort.* pp. 237–238, June 1, 1913; 3 ill.).—To facilitate the formation of roots in hard-wooded cuttings, it has been found advisable to expose the inner wood by making cross-cuts of an inch or so depth in the base of the cutting and turning back the bark slightly, the theory being that the bark itself is often an impediment to root production.—*C. T. D.*

Cuttings, keeping alive for long periods (*U.S.A. Dep. Agr., Bur. Pl. Ind. Circ.* 111; Feb. 1913; fig.).—Soft or herbaceous cuttings will survive a journey of six weeks in perfect condition if kept where they can be given light occasionally and attention is paid to supplying water lost. The apparatus required consists of a small quantity of living Sphagnum moss, two sheets of strong glass about 5 × 7 inches, and some string.

Prepare the cuttings as if they were to be inserted in the ordinary way, and arrange the first layer, without crowding, with the upper surfaces of the leaves on the first piece of glass, and place about 2–3 inches of living Sphagnum moss evenly distributed over them.

Place another layer of cuttings on top of this moss, with the under surfaces of the leaves next to the moss, so that all the available space will be covered, and on top of this second layer of cuttings place the second piece of glass.

Press down firmly, removing all protruding moss. The package is now a sandwich with the cuttings just beneath the glass on top of the moss. By keeping the moss moist and giving all light possible, bright sunlight being best, no harm will be done to them except fungous troubles. If the journey is from four to six weeks long, cuttings such as Clover, Alfalfa, *Dorycnium*, *Lotus*, and other plants will have rooted freely. Scions and bud sticks of rare plants keep a very long time if the moss is only slightly damped.—*F. J. C.*

Cutworm, A Little-known. By F. H. Chittenden, Sc.D. (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 109, pt. iv.; April 1912; 1 fig.). —During the past few years authentic evidence has been received of the injury done by this cutworm (*Porosagrotis vetusta* Walk.). It is apparently quite omnivorous as regards food plants, but shows some slight preference to cowpeas. It is related to the granulated cutworm (*Feltia annexa* Treit). Spraying affected plants with arseniate of lead appears to be the best remedy.—*V. G. J.*

Cytisus supranubius (*Bot. Mag.* tab. 8509).—Family *Leguminosae*, tribe *Genisteae*. Shrub. Leaves 3-foliate. Flowers clustered, lateral, ½ inch. White.—*G. H.*

Dendrobium × Luegerianum. By A. Hafka (*Oestr. Gart. Zeit.* vol. viii. pt. viii. pp. 230–231; 1 fig.).—*Dendrobium × Luegerianum*, obtained by fertilizing *D. nobile* with the pollen of *D. × Leechianum*, rejoices in plenty of moisture and grows readily in Osmunda fibre. In summer it does well in a cucumber house and must be frequently syringed. In autumn keep in a cool house at a temperature of 55° F. When the orchid is brought into a warm house in winter it bears a large number of flowers, varying in colour from cream to dark violet in the petals and sepals. The lip ranges between claret and dark purple in colour. The plant should be potted in June every second or third year.—*S. E. W.*

Derris oligosperma (*Bot. Mag.* tab. 8530).—Family *Leguminosae*; tribe *Dalbergieae*. New Guinea to New South Wales. Shrub, climbing over 50 feet long. Leaves compound, 6 inches long; leaflets 5–6 paired. Racemes 5 inches long. Flowers less than an inch long, white.—*G. H.*

Disease Resistance, Inheritance of. By R. H. Biffen (*Jour. Agr. Sci.* vol. iv. pp. 421–429).—Wheat plants found immune in the second generation from a cross between a badly rusted plant (attacked by *Puccinia glumarum*) and an immune one, were found to breed true to the immunity, but proved susceptible to the black rust, *Puccinia graminis*. The degree of susceptibility among the remainder varied greatly, and it is also shown that the type of manuring practised affected the results.—*F. J. C.*

Dracaena Hybrids. By Borsos (*Oestr. Gart. Zeit.* vol. vii. pt. xi. pp. 331–334).—Dracaenas are best increased from cuttings, inserted in pots of sandy peat, deal sawdust, or warm water. The cuttings rest on charcoal and are kept in a propagator at 80–86° F.

When the roots appear in two or three weeks, re-pot the cuttings and gradually admit air. Now is the time to move to a temperature of 65° F., giving the pots bottom heat, finally half bury the pots in a hotbed. Syringe daily and pour water between the pots. In six weeks transfer to a freshly made hotbed and re-pot if necessary. In summer the plants require to be syringed four times a day, if possible with rain water. The plants must not be exposed to direct sunlight before September.—*S. E. W.*

Drying Lumber at Atmospheric Pressure, Principles of; and Humidity Diagram. By H. D. Tiemann (*U.S.A. Dep. Agr., Forest Service, Bull.* 104, December 16, 1912).—The Forest Service has for a number of years made experiments in drying lumber, and with a considerable amount of success. The two fundamental principles on which success in kiln-drying depends are a proper control of the two conditions, (1) heat and (2) relative humidity. Great care is necessary in drying the timber, for although the strength of wood increases with its degree of dryness, yet wood which has been dried and resoaked is less resilient than when green.—*A. D. W.*

Education, Horticultural, in Prussia (*Jour. Bd. Agr.*, vol. xx. No. 9, pp. 771–773).—A brief account is given of the facilities for higher horticultural education at the Royal School for Gardeners at Dahlem, the Royal Pomological Institute at Proskau, and the Royal School for Fruit Cultivation, Vine-growing, and Gardening at Geisenheim-on-the-Rhine.—*A. S.*

Electricity and Crop Production, Experiments on. By J. H. Priestley (*Jour. Bd. Agr.* vol. xx. No. 7, pp. 582–594).—Experiments were carried out at Garforth during the summer of 1912 "to settle a very important point, hitherto neglected," viz. the exact current which is delivered to plants by the overhead electrical discharge. As soon as the current under the wire had been determined, measurements in other parts of the field at varying distances from the charged overhead wires were made. "These determinations soon showed that the effect of the discharge could by no means be looked upon as restricted to the area under the wires, but that on a still day a current at least a thousand times the normal was to be found at a distance of some thirty to forty yards out from the wires, while on a windy day, even though the wind was comparatively light, the current travelled out away from the wires down the wind for quite unexpectedly long distances." These results are quite capable of explaining the numerous discrepancies and contradictions to be found in the literature of field experiments on electricity and crop production, since they show that "a control area unaffected by the discharge cannot be obtained within hundreds of yards on the leeward side of the electrified area."

The results are given of field experiments carried out at Dumfries during 1912 with potatos, but, as the author points out, they cannot be looked upon as decisive, since, in the light of the Garforth experiments, the electrified and control areas probably have to be regarded as virtually both electrified areas.

The problem of how a genuine control area can be provided near enough to the charged wires to be under similar conditions to the electrified area as regards soil, climate, and exposure, is now being made the subject of experiment.—*A. S.*

Elm Die-back (*Ueber Exosporium Ulmi* n.sp.). By Prof. Dr. J. Eriksson (*Mycol. Centralb.* vol. i. pp. 35–42; 1912; plate).—The attack of a new species of *Exosporium* called *ulmi* by the author, upon the shoots of *Ulmus montana, U. montana exonensis, U. campestris*, and *U. effusa* is described. The young shoots are caused to die, and it is recommended to prune off and burn the affected parts before the fungus fruits in March.—*F. J. C.*

Epidendrum falcatum. By M. Ehinger (*Orchis*, vol. vii. pt. v. pp. 70–72; 1 fig.).—*Epidendrum falcatum* has short branched hanging stems and fleshy leaves. During the period of growth this orchid requires warmth and plenty of moisture. In June and July

it bears greenish-white flowers which last six or eight weeks. The labellum is pure white. After flowering the plant is kept dry. It likes plenty of sun, and grows and flowers more vigorously as it grows older.—*S. E. W.*

Explosives. By H. C. Coggins (*Agr. Gaz. N.S.W.* vol. xxiv. pt. v. pp. 375–380; 2 figs.)—Gelignite or blasting gelatine is recommended for loosening the subsoil. The advantages of subsoiling are that it improves the drainage, renders the plant-food and moisture in the soil accessible to the roots, and admits air, thus making the soil more fertile.—*S. E. W.*

Fairy Rings (*Gard. Mag.* No. 3116, p. 537; July 9, 1913).—Miss Baylis has obtained satisfactory evidence that *Clitocybe gigantea* and *Marasmius Oreades*, which form these rings, are parasitic on the roots of the grasses, which are killed by the toxic substance secreted; some secretion is also toxic to the fungi and prevents its reproduction in the same position. The increased growth of the grass on the margins is due to additional nitrogenous food set free by the action of the fungi.—*E. B.*

Farmyard Manure, Enrichment of, by Cake Feeding. By A. D. Hall (*Jour. Bd. Agr.*, vol. xx. No. 8, pp. 665–672).—In an article dealing mainly with the question of whether many farmers might not with advantage reduce their feeding-stuff bill and increase the amount spent upon nitrogenous artificial manures, the author very clearly shows the relative value of dung made by bullocks fed upon roots and hay only, as compared with that made by others fed upon roots and hay plus an allowance of cake or other concentrated food.

Analyses showed (*a*) that "cake-fed" dung is richer in nitrogen than ordinary dung, and (*b*) that most of the extra nitrogen is in a soluble and active form.

Experiments were commenced at Rothamsted in 1904 to ascertain the relative crop-producing powers of equal weights of the two sorts of dung, not only in the year of application, but in the three subsequent years. Nine years' results are now available, and they are in exact accord with the expectations one would form from the composition of the two kinds of manure. In the year of application the "cake-fed" dung has a great superiority, producing double the increase of crop that the ordinary dung gives; *e.g.*, if the yield on the unmanured plot was 3 qrs. of wheat, 16 tons an acre of ordinary dung would raise it to 4 qrs., and 16 tons an acre of "cake-fed" dung to 5 qrs. The second crops grown with the dung are, however, much more nearly alike, whilst in the third and fourth years the superiority of the "cake-fed" dung has entirely disappeared, though both kinds are still effective in producing an increase of crop over the unmanured plot.

The conclusion drawn from the experiments is that the extra

value conferred upon dung by cake-feeding is not of an enduring nature; the first crop grown with the dung gets the benefit, and to a slight extent the second; but the added fertility due to the cake-feeding has not the lasting effect of the dung itself.—*A. S.*

Fire-blight Disease in Nursery Stock. By V. B. Stewart (*U.S.A. Exp. Stn., Cornell, Bull.* 329; April 1913; figs.). — This disease; due to *Bacillus amylovorus*, is not yet definitely known to exist in Great Britain. A full account is given of it and the methods of control, which in the case of nursery stock consist mostly in the removal of diseased pieces by means of a knife sterilized with corrosive sublimate and the prompt destruction of the prunings.—*F. J. C.*

Forest Fire Protection under the Weeks Law in Co-operation with States. By J. Girvin Peters (*U.S.A. Dep. Agr., Forest Service, Circ.* 205 (1st revision), January 8, 1913).—The Forest Service is charged with the protection of 163 National Forests, aggregating nearly 200,000,000 acres. The importance of protection against fires cannot be overrated when it is estimated that on an average 10,000,000 acres are burned over annually in the United States.—*A. D. W.*

Forest Fires on Standing Hardwood Timber, Effect of. By W. H. Long (*U.S.A. Dep. Agr., Forest Service, Circ.* 216, May 31, 1913).—Excellent advice is here given as to the citizen assisting the State in dealing with forest fires. The continued burning of timbered lands in Arkansas is causing an annual loss of thousands of dollars—an absolute detriment to the welfare of the State. It is suggested that much good may be brought about if all the people will only co-operate in the work of preventing forest fires.—*A. D. W.*

Forest Fires, Methods and Apparatus for the Prevention and Control of. By D. W. Adams (*U.S.A. Dep. Agr., Forest Service, Bull.* 113, November 8, 1912).—It is not generally realized that in some parts of America the losses, including those of forest produce and young trees, are in excess of the annual consumption of timber for commercial uses. The various methods of combating forest fires have received much attention in the Arkansas woodlands, and the most reliable and up-to-date are included and illustrated in this bulletin.—*A. D. W.*

Forest, The Composite Type on the Apache National. By Harold H. Greennamyre (*U.S.A. Dep. Agr., Forest Service, Bull.* 125, January 25, 1913).—The Colorado blue spruce (*Picea Parryana*) has hitherto only been found in quantity in the Central Rocky Mountain States, but now, mixed with the Western Yellow Pine (*Pinus ponderosa*) and Douglas Fir (*Pseudotsuga taxifolia*), it has been discovered in considerable quantity on the Apache and adjacent National forests in Southern Arizona. This combination of three species, each having different requirements, makes it possible for a complete utilization of the ground, thus satisfying at least one of the objects of sylviculture.

A. D. W.

Forest Trees in Western Nebraska, Growing. Shrubs and Ornamentals. By W. P. Snyder (*Nebraska Agr. Exp. Stn., Bull.* 137, May 26, 1913).—By trying to grow forest trees without preparation of the soil much loss has resulted to the farmers of Western Nebraska. From a purely commercial point of view the result has been a failure which is evidenced by the want of both forests and timber in that district. Now, however, by a proper system of cultivation and irrigation excellent results have been attained. Part 2 is very interesting and instructive, dealing as it does with the shrubs and flowers that succeed in Nebraska.—*A. D. W.*

Forestry, Quart. Jour. of (No. 4, Vol. 7, October 1913).—"Forest Soils and Surface Conditions" is a valuable paper as treated here, and certainly has a distinct and important bearing on the cultivation of timber-producing trees. Some interesting information on the behaviour of the oak in Dean Forest is contained in a paper under the heading of "Yield Table for Oak in Dean Forest." The writer says truly that those who wish to compile yield tables are debarred from doing so by the difficulty in obtaining figures regarding thinnings. On most large estates the practice of keeping an account of such should be extended. It is interesting to know, although by no means new, that the Corsican Pine is attacked by the Larch Canker. Excessive grass around the trees renders them more liable to the disease.—*A. D. W.*

Fruit Fly, The Mediterranean. By A. L. Quaintance (*U.S.A. Dep. Agr., Bur. Entom., Circ.* 160; Oct. 1912; 1 fig.).—The recent establishment in Hawaii of this destructive pest, and the quarantine restrictions against Hawaiian fruit imposed by the State of California, have aroused considerable interest, and there have been frequent requests for information concerning it. This circular is compiled from the writings of entomologists in countries where the insect exists.

The species belongs to the family Trypetidae of the order Diptera, for which no very successful means of control have yet been found. Despite many experiments, little has been discovered that is of value in lessening the injury done by it except the collection and destruction of all fallen infested fruit, and the more recent use in South Africa of a poisoned bait sprayed over the trees for the destruction of the adult flies.

The bait consists of a solution of 5 gallons of treacle, 1 lb. arseniate of lead, and 25 gallons of water, or 3 lb. sugar, 4 oz. arseniate of lead, 5 gallons of water.—*V. G. J.*

Fruits, Notes on Breeding. By Chas. G. Patten (*U.S.A. Hort. Soc., Minnesota, Trans.* 1912; pp. 8–11).—Varieties of Apples have been raised which shed their leaves by the middle of October, instead of a month later, as is usual with those from temperate climates, with the result that the wood is sufficiently ripened to stand the severity of the winter.—*A. P.*

Fungous Parasites of Coccidae and Aleurodidae in Florida, Utilization of. By J. R. Watson (*Jour. Econ. Entom.* vol. v. pp. 200-204, April 1912).—The author, after recounting the experience with these parasites in Florida, concludes that the results justify the trial of this method of dealing with insect pests in all moist tropical and subtropical countries.—*F. J. C.*

Fusariums, from Cankered Cacao-bark and Nectria cancri, *N.S.*, The. By A. A. L. Rutgers (*Ann. Jard. Bot. Buit.*, ser. ii. vol. xii. pt. i., 1913, pp. 59–64; with 4 plates).—The author isolated fungi from the diseased bark of fifteen different Cacao-trees; these all appear to belong to the genus *Fusarium*. They are not the cause of cacao-canker, which is due to the attack of another fungus, *Phytophthora Faberi* Maubl.

The Fusariums isolated by the author fall into two groups, one corresponding to *F. colorans* de Jonge, and the other to *F. theobromae* Appel and Strunk.

Not all the fifteen strains of *Fusarium* formed perithecia. *F. colorans* never did, and only five strains of *F. theobromae* produced this fruit-form.

These perithecia appear to belong to the genus *Nectria*, but to constitute a new species of this genus, which the author names *N. cancri*.

A diagnosis of the new species concludes the paper.—*R. B.*

Genista hispanica (*Bot. Mag.* tab. 8528).—Family *Leguminosae*, tribe *Genisteae*. Portugal and Spain to Liguria. Undershrub, erect, spinescent, except when flowering, the shoots then have leaves $\frac{2}{5}$ inch long. Racemes dense, $\frac{3}{4}$ inch long and wide. Corolla yellow.—*G. H.*

Gooseberry Gall Midge or Bud-Deformer. By J. S. Houser (*Jour. Econ. Entom.* vol. v. pp. 180-184, April 1912; plates).—This insect (*Rhopalomyia grossulariae*) is a new pest of the gooseberry. The larvæ feed in the terminal buds, causing the bud scales to become larger and more numerous, so that the bud assumes the form of a miniature pine cone. The bud fails to produce normal leaves and develops secondary buds within or about the first, which become infested in turn, so that a large cluster of galls is produced. The buds sometimes give rise to feeble shoots. The fly is very small and the larva only 2 mm. long. They are to be found in the galls in the spring and winter. The remedy is obviously the cutting out and burning of the galls during the winter.—*F. J. C.*

Graft Hybrid of Rhododendrons. By D. Bois and G. T. Grignan (*Rev. Hort.* p. 342, Aug. 1, 1913).—On *R.* 'Cunningham's White,' a stock generally used, was grafted the fine variety 'Madame Linden' (*ponticum*), with the result that an unobserved shoot on the stock just below the graft blossomed, producing flowers of a pale rosy lilac though the scion bears white flowers and the stock deep rosy lilac ones much spotted with dark red. There are also differences from either plant in the leaf form, which approaches that of the scion.

C. T. D.

Graft Hybrid, Peach and Almond. By L. Daniel and I. Delpon (*Rev. Hort.* pp. 394–395, Sept. 1, 1913).—An interesting record of a case somewhat similar to that of *Cytisus Adami*. A Peach grafted on an Almond yielded as first crop true Peaches, but in the next year a number of buds were produced of mixed character, Almond, Peach, and intermediates being intermingled. Two seeds of the graft have yielded trees, one strong, the other feeble, which have not so far flowered, but the foliage presents resemblances to both kinds. These results assimilate to those produced by *Amygdalus communis persicolor*, a presumed sexual hybrid.—*C. T. D.*

Grafts, On the Transmission through the Graft of Chemical Substances formed by the Stock Plants and vice versa. By Lucien Daniel (*Rev. Hort.* pp. 329–330, July 16, 1913; pp. 348–350, August 1, 1913; 2 ill.).—A very interesting article, dealing with the effect of the stock on the scion in connexion with fruit production, &c. A proved instance that such transmission of different chemical products does occur as cited when a graft of a tomato on a Belladonna stock produced tomatos containing an alkaloid allied to atropine, and capable of producing the same pathological effects, though normally there is no trace of this in the tomato on its own roots.—*C. T. D.*

Grape 'Panariti' (*U.S.A. Dep. Agr. Year Book*, 1911, p. 433; col. plate).—A Grecian variety used for drying for the Currant of commerce. Recommended for experiment in California.—*E. A. Bd.*

Grasses, New, for Southern Climates (*U.S.A. Dep. Agr. Year Book*, 1912, pp. 495–504; 6 plates).—An account of experimental trials with New Grasses for fodder purposes. Rhodes Grass, Sudan and Tunis Grass, and others are described and figured, and cultural methods indicated.—*E. A. Bd.*

Grass Parasite, A New. By G. Massee (*Jour. Bd. Agr.*, vol. xx. No. 8, pp. 701–703; 1 plate).—The disease caused by the fungus *Cladochytrium graminis*, Büsgen, which was first observed in this country in 1908, has been notified at Kew during 1913 from several widely separated localities in the south of England. The disease, which so far seems to be most prevalent on lawns, tennis grounds &c., first appears in the form of small yellowish patches, a few inches across, scattered over the lawn. These patches increase in size, more particularly after a fall of rain, and often encroach on each other, forming large irregularly shaped areas, which eventually become brown, owing to the entire disappearance of the grass.

Watering after rain has fallen with a solution of iron sulphate, half a pound to a gallon of water, is recommended. The treatment should be repeated two or three times at intervals of about ten days.

The fungus is probably distributed with grass seed, for microscopic examination showed that 5 per cent. of the seeds in a sample which had produced a diseased crop contained resting-spores of the fungus in the seed coat. It is doubtful whether any known method of seed

sterilization such as is effective with the spores of "smut" and "bunt" would prove of value, as the thick-walled resting-spores are embedded in the tissues of the seed.

"Now that the disease is undoubtedly present, and perhaps to a greater extent than is realized, the most certain method for preventing its wholesale distribution turns on the selection of seed from districts free from the disease, and as the symptoms are so evident in the field, and so readily corroborated, or otherwise, in the laboratory, this should prove a comparatively easy matter."—*A. S.*

Grass Vegetation on the Okaimpuro Farm in German South-West Africa. By R. Pilger (*Not. König. Bot. Berlin*, vol. vi., No. 52, pp. 70–71, September 1913).—This farm lies 15 km. west of Waldau and 35 km. north of Okahanza. It furnishes a very typical example of the varieties of grass which occur upon grazing land in this region.

On the highest portions of the land *Aristida uniplumis* Licht. alone occurs. In the hollows the meadows consist of a mixture of grasses: *Panicum notabile* Hook., *Tricholaena madagascariensis* (Nees) Mez., *Tricholaena Dregeana* (Nees) Dur. and Schinz, *Pennisetum ciliare* (L.) Link, *Anthephora pubescens* Nees, *Aristida adscensionis* L., *Pappophorum cenchroides* Licht, *Schmidtia quinqueseta* Benth., *Eragrostis superba* Wawra. and Peyr., *E. porosa* Nees, *E. angusta* Hack., *Aristida uniplumis* Licht.

Anthephora pubescens is a particularly valuable grass for fattening oxen.—*R. B.*

Greenheart. By C. D. Mell and W. D. Brush (*U.S.A. Dep. Agr., Forest Service, Circ.* 211, January 23, 1913).—The lasting properties of the timber of the Greenheart (*Nectandra Rodiei*) are known the world over; in fact, authentic records show that in this respect it surpasses iron and steel in durability when placed in conjunction with either water or soil. It is a large growing tree, often 60 feet high and from 3 to 4 feet in stem diameter.—*A. D. W.*

Grevillea bipinnatifida (*Bot. Mag.* tab. 8510).—Family *Proteaceae*, tribe *Grevilleae*. W. Australia. Shrub, spreading or prostrate, 3 feet high. Leaves 2-pinnatifid, 3–6 inches long. Racemes solitary or several in a terminal panicle 6 inches long. Perianth red, pubescent.—*G. H.*

Hardwoods, Second-Growth, in Connecticut. By Earl H. Frothingham (*U.S.A. Dep. Agr., Forest Service, Bull.* 96, May 8, 1912).—By far the most important facts to know in dealing with woodlands are the rates of growth of the various species of trees, the value of the standing timber, and the system of management that will give the greatest yield of the most valuable wood in the shortest period of time. The forests of Connecticut have supplied these data, and the tables of value per acre and volume of timber are interesting additions.—*A. D. W.*

Herbaceous Plants, New. By Kache (*Gartenflora*, vol. lxii. pt. iv. pp. 75–78 ; 2 figs.).—*Artemisia lactiflora*, a native of China, forms a bush 6 feet in height, covered with dark-green foliage. From August to October it is covered with panicles of flowers which are greenish-yellow when they open, but change to milk-white. It prefers a rather heavy moist soil in half shade.

Thalictrum dipterocarpum comes from China. It resembles *T. aquilegifolium*, but is larger and is more beautiful in the colour of its foliage. It is covered with flowers from August until it is cut down by frost. The blooms are pink to lilac-blue in colour. The Thalictrum enjoys exposure to full sun and good drainage.—*S. E. W.*

Hollow Trees. By W. J. Bean (*Bull. Roy. Bot. Gard., Kew*, No. 7, 1912, pp. 338–339 ; 2 plates).—" There is no doubt that hollow places in the trunks and limbs of trees formed by decay are better filled up," and the article describes the way in which that object can be best accomplished.

The cavity should first be cleared of all decaying material, and the surface of the wood thus exposed should be washed with a strong solution of carbolic acid. After allowing a day or two to dry, a good thick coating of ordinary tar should be laid on. The cavity should then be filled, using, if it be a small one, Portland cement, or if a large one, a layer of bricks, which should afterwards be surfaced with cement. A surface over which the new bark can grow is thus provided, and if the tree is in a vigorous state, as many hollow trees are, the bark will in time close over the " stopping."

The majority of decayed hollows have their origin in snags left by branches which have been broken off, and which have rotted back into the trunk. Branches removed by design, or broken off by wind or accident, should always be sawn off close to the trunk, and the sawn surface should be coated over with ordinary coal tar.—*A. S.*

Hop Mildew. By F. M. Blodgett (*U.S.A. Exp. Stn., Cornell, Bull.* 328 ; March 1913 ; figs.).—After an account of the mildew and notes on the relation between the weather and infection, methods of control are described. From forty to seventy-five pounds of very finely ground sulphur applied on an acre of hops gave the best results. The sulphur was found to act as a good preventive. Flowers of sulphur give better results than the usual coarsely-ground sulphur flour.—*F. J. C.*

Hybrids, Comparison of Structure with Parent Plants. By F. R. Brown (*U.S.A. Exp. Stn., Mississippi, Bull.* 3, 52 pp. ; 38 figs.)—The title sufficiently indicates the scope of this paper. An historical review is given, and a bibliography. The plants especially studied are *Nicotiana*, and Kohlrabi and Radish.

The majority of histological characters are found to be intermediate.

E. A. Bd.

Hydrangea hortensis. By A. Geist (*Oestr. Gart. Zeit.* vol. viii. pt. x. pp. 297–299; 1 fig.).—The production of blue flowers is promoted by watering the Hydrangeas once a fortnight with a 1 per cent. solution of ammonia alum.—*S. E. W.*

Hydrangea hortensis. By D. Bois and G. T. Grignan (*Rev. Hort.* p. 342, Aug. 1, 1913).—Descriptions of three new varieties, 'Souvenir de Madame Beranger,' 'Madame Philippe de Vilmorin,' and 'Rose de Tours,' certificated as new at the Cours-la-Reine Exhibition.—*C. T. D.*

Insect Pests Scheduled by the Board of Agriculture. By H. C. Long (*Gard. Chron.* 1913).—This series is continued as follows:—

The Colorado Beetle, Oct. 4, p. 233, with fig.
The Cherry Fruit Fly, Oct. 18, p. 271, with coloured plate.
American Pear Blight, Nov. 8, p. 319.
Tomato Leaf Spot, Dec. 13, p. 417, with fig.—*E. A. B.*

Iris mellita (*Bot. Mag.* tab. 8515).—Family *Iridaceae*, tribe *Irideae*. Thrace and Asia Minor. Herb. Leaves densely tufted, 2½ inches long. Perianth with a greenish tube, blotched with red, limb 1½ inch long, lurid purple or yellow; veins reddish.—*G. H.*

Iris Regelio-cyclus. By A. Steffen (*Gartenflora*, vol. lxii. pt xiv. pp. 301–306; 2 figs.)—The Regelio-cyclus Iris is a beautiful free-flowering hybrid obtained by crossing Regelia (*I. Korolkowi*, *I. violacea*, *I. concolor*, or *I. venosa*) with an Oncocyclus iris, such as *Susiana* or *iberica*. The best of these hybrids is 'Terpsichore,' which bears large purple flowers with ultramarine veins. Dido, Hebe, Hecate, Isis, Sirona, Flora, and Iphigenia are all worth growing. In the beginning of October plant the Iris in a mixture of loam and old mortar in wire baskets sunk in the ground in a well-drained sunny situation. In summer the baskets are taken up and placed on a dry shelf for the rhizomes to ripen. The Iris dies if the seed is left to ripen. The seed of hybrid Iris seldom germinates.—*S. E. W.*

Iris Xiphium, Forcing of (*Gard. Chron.* Nov. 22, 1913, p. 357).—Full and practical details for forcing Spanish Irises in quantities for market purposes.—*E. A. B.*

Iron, Absorption of, by Plants (*Gard. Chron.* Nov. 1, 1913, p. 299).—Describes possible cases of inability to absorb iron from soil if protoplasm is impermeable to it, and suggesting that a compound of ammonium nitrate and iron would be available for absorption if applied in solution.—*E. A. B.*

Jacaranda acutifolia and Lagerstroemia indica. By Eugen Vetter (*Die Gartenw.* May 3, p. 241).—The author describes the inconceivable splendour of these two flowering trees in the streets of Lima. *Jacaranda acutifolia*, a native of Peru, has gorgeous violet-blue flowers. When in bloom the tree resembles a gigantic bouquet.

Its companion, the *Lagerstroemia*, the author calls the lilac of the tropics, being a worthy substitute for our Syringa, blooming more profusely, lacking only the fragrance. Both trees are propagated from cuttings, 6 feet in length, about the thickness of a thumb, inserted in winter in the open ground. Of the cuttings thus treated, at least 40 per cent. grow. As the author quaintly says, a passer-by coveting one of these splendid trees has only to break off a twig of the same and insert it in the ground, and within six months he has a tree in a perfect state of development.—*G. R.*

Jute, Inheritance of Red Colour, and Regularity of Self-Fertilization in. By R. S. Finlow and I. H. Burkill (*Mem. Dep. Agr., India, Bot. ser.*, vol. iv. pp. 73–92 ; March 1912). —The authors show that the red colour of jute stems is dominant over green and that various intermediates in tint occur in the F_2 generation. The jute is practically always self-fertile.—*F. J. C.*

Ladybird, Food of (*U.S.A. St. Com. Hort. Cal., Bull.* vol. i., No. 13, Dec. 1912 ; 6 figs.).—The larvæ of the ladybird (*Chilocorus similis* Rossi, of Japan) feed on the scale insects, and each larva during its total larval period will eat from seven to eight hundred scales, while the adult ladybird eats from eight to nine hundred, averaging from twenty to forty scales daily. It would seem that this insect is worth encouraging.—*V. G. J.*

Longevity of Seeds (*Kew Bull.* No. 2, 1912, p. 110).—Quotations are given from letters addressed to Kew by Sir William Herschel, Bart., who has been successful in raising a number of plants of *Albizzia lophantha* from seeds which had been lying dormant for sixty-eight years.—*A. S.*

Mandevallia muscosa. By E. Miethe (*Orchis*, vol. vii. pt. vii. pp. 104–106 ; 1 fig.).—This orchid bears small flowers on a hairy stem 6 inches in length. The most interesting feature of the plant is a yellow spot in the centre of the flower which, when gently touched, causes the triangular lip to fold over, forming an enclosed space round the reproductive organs.—*S. E. W.*

Meadow Saffron, Eradication of (*Gard. Mag.* No. 3105, p. 310 ; May 3, 1913).—Two implements have recently been described in the German journals designed to eradicate the *Colchicum autumnale*.

One consists of a digging-iron fitted with cutting cross-blades which chop the corms to pieces, when they quickly decay ; the other is fitted with prongs and a hinge, and the corm is clasped beneath and pulled out of the ground ; so far, however, it has not proved possible to clear ground in less than two or three years. It may be mentioned, therefore, that by the use of a heavily-weighted bush-harrow, drawn over the ground in autumn a sufficient number of times to destroy the flowers, seeding is prevented and meadows can be cleared in a similar time.—*E. B.*

Merodon equestris. By A. J. Bliss (*Gard. Chron.* Oct. 18, 1913, p. 268).—Further particulars about the life-history of *Merodon equestris*, especially as to duration of life-cycle and manner of entering the bulb.—*E. A. B.*

Mine Timbers, The Preservation of. By E. W. Peters (*U.S.A. Dep. Agr., Forest Service, Bull.* 107, May 31, 1912).—To secure the most authentic information on the efficiency of various methods of preserving mine timber from decay, the Forest Service has carried out a number of investigations, which have been conducted (1) to determine the best methods of treating timber used for mining purposes, and (2) to determine the durability of treated and untreated timber in actual service.—*A. D. W.*

Morania corallina (*Bot. Mag.* tab. 8527).—Family *Palmaceae*, tribe *Areceae*. Columbia. Palm. Stem erect, slender, 12–20 feet high. Leaves few, 6–7 feet long, pale green. Inflorescence dicœcious. Flowers very small. Berries globose, $\frac{2}{3}$ inch across, many on a large panicle, scarlet.—*G. H.*

Mushrooms, Insects Injurious to. By C. H. Popenoe (*U.S.A. Dep. Agr., Bur. Entom., Circ.* 155, Oct. 1912; 7 figs.).—The insects which usually attack cultivated mushrooms may be roughly divided into four classes, viz. mushroom maggots, mites, springtails, and woodlice. The most injurious is the mushroom maggot (*Sciara multiseta* Felt. et al.), which is the larva of a small two-winged fly. Each female is capable of laying nearly 1000 eggs, which are generally deposited at the junction of the stem and cap. The larvæ feed on the mushroom for seven to ten days, and after spinning a slight cocoon pupate just beneath the surface of the soil. The pupa stage lasts from four to seven days.

All mushroom houses should be constructed so as to permit of effective fumigation, and should also be fitted with light screens of fine wire gauze to prevent the ingress of the adult flies. Nicotine appears to be the best fumigant.

Woodlice (*Armadillidium* spp. and *Porcellio* spp.) often do considerable damage to mushroom beds. These may be trapped by laying about the beds pieces of cut potato plastered with Paris green on the cut side. Or the house may be fumigated with hydrocyanic gas.—*V. G. J.*

Narcissus Flies. By R. S MacDougall (*Jour. Bd. Agr.* vol. xx. No. 7, pp. 594–599).—A description is given of the Large Narcissus Fly, *Merodon equestris* Fab., and a résumé of what is known of the history and habits of the pest and the best methods of dealing with it.

The Small Narcissus Fly, *Eumerus strigatus* Fln., is also briefly dealt with, and mention is made of larvæ of *Sciara* and of several species of *Mycetophilidae* having at different times been found in decaying bulbs.—*A. S.*

Narra Fruit, The. By Dr. Cl. Grimme (*Agr. Jour. Cape G.H.*, vol. v. No. 3, March 1913, p. 468).—The Narra (*Acanthosicyos horrida* Welw.) belongs to the Cucurbitaceae. It has no leaves, has thickly interlaced green tendrils, and at short intervals sharp thorns in pairs, thus effectually protecting against browsing animals. Its root is as thick as one's arm, and often 15 metres long. Its fruit is larger than a croquet ball and often weighs 3 lb. When ripe it has a sweet-sour taste, can be divided into ten sections, after the manner of an orange; has a great many seeds and forms the chief article of food of the Hottentots of Walfish Bay Territory.—*A. A. K.*

Nautilocalyx pallidus (*Bot. Mag.* tab. 8519).—Family *Gesneraceae*, tribe *Cyrtandreae*. Peru. Herb, branching at base with several stems, 1½ foot high. Leaves ovate-lanceolate, 6–10 inches long. Cymes 3–6-flowered. Corolla creamy-white; tube with spur 2 inches long.—*G. H.*

Nitrogen, Direct Assimilation of Inorganic and Organic Forms of, by Plants. By H. B. Hutchinson and N. H. J. Miller (*Jour. Agr. Sci.* vol. iv. pp. 282-302, January 1912; figs.).—A review of present knowledge with regard to the assimilation of nitrogen is first given, then an account of experiments whereby it was sought to ascertain whether nitrogen could be assimilated directly from other nitrogen compounds than nitrates and nitrites of the metals. It was found that ammonium salts, formamide, acetamide, urea, barbituric acid, alloxan, and "humus" were readily assimilated; glycine, α-aminopropionic acid, guanidine, hydrochloride, cyanuric acid, oxamide, and peptone were assimilated, but less readily; hippuric acid, trimethylamine, para-urazine, hexamethylenetetramine, ethyl nitrate, propionitrile, hydroxylamine hydrochloride, and methy carbamate were not assimilated; while tetranitromethane proved toxic. Peas were the plants used, and considerable variation in the root development was seen.—*F. J. C.*

Novelties, The Protection of. By Antoine Rivoire (*Rev. Hort.* pp. 395–396, Sept. 1, 1913).—Particulars of steps being taken by the International Professional Horticultural Union ("l'Union horticole professionnelle internationale") to secure protection on copyright lines for horticultural novelties. The society is stated to consist of professional Horticultural Societies of France, England, Germany, Belgium, Holland, Switzerland, Italy, Luxemburg, Sweden, Denmark, and Austria, the secretariat being in Holland and the presidency in France.—*C. T. D.*

Oleander (*Nerium Oleander* Linn.) **as a Poisonous Shrub.** (*Agr. Jour., Cape G.H.*, vol. iv. No. 6, December 1912, p. 887).—Of this plant it is noted: "The bush is extremely poisonous, and several cases are on record of valuable stock having been killed from browsing on it. It does not appear to be very appetising, but, as it is green n winter, animals which have been kept stabled and are allowed to

run for a few hours for exercise are apt to nibble at the bushes, especially if they are growing as hedges between the garden and 'werf' or yard, or, as is often seen, as isolated bushes around the homestead."

The plant is poisonous to human beings, and there is danger of young children gathering the flowers and putting the stems into their mouths, with serious results.—*A. A. K.*

Oleoresins of some Western Pines, An Examination of the. By A. W. Schorger (*U.S.A. Dep. Agr., Forest Service, Bull.* 119, January 11, 1913).—Oleoresin, or turpentine, as we know it, is different in composition in different species of trees. This is really a scientific report on these liquid solutions. Altogether the researches carried out must be of the utmost value to those who are interested in what may be termed the secondary products of the forest.—*A. D. W.*

Oncidium crispum in the House. By A. Braecklein (*Orchis*, vol. vii. pt. v. pp. 73–75; 1 fig.).—*Oncidium crispum* flourishes in a mixture of Sphagnum and Osmunda fibre in the east window of a dwelling-room. The brown flowers with yellow markings are sweet-scented. During the period of growth plenty of water and frequent syringings are necessary, but the latter must cease when the buds appear. In winter, the rest period, do not water and do not expose the plants to cold.—*S. E. W.*

Onions, Insects injurious to (*U.S.A. Dep. Agr., Year Book* 1912, pp. 319–334; many figs.).—A lengthy and detailed account of various insect pests affecting the onion, their identification and treatment.

E. A. Bd.

Orange 'Thomson' (*U.S.A. Dep. Agr., Year Book* 1911, p. 436; col. plate).—One of the navel varieties of exceptional attractiveness.

E. A. Bd.

Orange Trees. By O. Brooks (*Agr. Gaz. N.S.W.* vol. xxiv pt. v. p. 444).—Unfruitful orange trees bore good crops after a spiral incision was made, removing a strip of bark $\frac{1}{8}$ inch wide.—*S. E. W.*

Orchid Pots. By G. Ratz (*Orchis*, vol. vii pt. vi. pp. 89–92; 2 figs.).—A very porous earthenware cylinder, $6\frac{1}{2}$ inches long and 2 inches internal diameter, closed at one end, is provided with 15 round holes $\frac{1}{2}$ inch in diameter, starting $1\frac{1}{2}$ inch from the bottom. One side of the pot is covered for $\frac{3}{4}$ of its length with moss fastened by nickel-plated copper wire. The orchid is placed on the moss, with its roots spreading round the cylinder; it is covered with a layer of moss tied in position with raffia. The cylinder is filled with charcoal and suspended by a wire from a suitable rod. The bottom of the pot is filled with water every day and the orchid is syringed twice daily. A pinch of pigeon dung is scattered on the charcoal every two or three months.

S. E. W.

Oyster-shell Scale. By F. Sharman (*U.S.A. Exp. Stn., N. Carolina, Bull.* 185, June 1913; figs.).—This scale (*Lepidosaphes ulmi*), which is well known here as mussel scale, attacks a large variety of trees and shrubs, and is said to be, next to the San José Scale, the most important scale in apple orchards in the district, is described and an account of its life-history is given. The eggs hatch in April and spraying should be commenced then or early in May, to kill the young, when 15 per cent. kerosene emulsion may be used. One gallon of soluble oil to 8–10 gallons of water may be applied during winter, or 25 per cent. kerosene emulsion, or lime sulphur washes. It is recommended to cut out all diseased, dead, or otherwise useless branches before commencing to spray.—*F. J. C.*

Oxalis crenata, An Edible Tuberous Species. By Henri Blin (*Rev. Hort.* p. 281, June 16, 1913).—An interesting article on the culture of three varieties forming yellow, white, and red tubers, the first two being preferable to the third. The plant is hardy and produces considerable numbers of small edible tubers in potato-like lines when cultivated in trenches in a similar way. The foliage can be used as a salad, and is capable of yielding a drink which, after fermentation, is very agreeable. Culture is easy and the tubers are procurable from the trade. Forms a pleasant culinary addition to mushrooms.—*C. T. D.*

Parasite of Thysanoptera, An Internal. By H. M. Russell (*U.S.A. Dep. Agr., Bur. Entom.*, Tech. Ser. 23, pt. ii.; April 1912; 11 figs.).—This is an account of the life-history of *Thripoctenus russelli*, reared by the author from the prepupa of *Heliothrips fasciatus* Pergande.—*V. G. J.*

Pea Moth. By R. S. MacDougall (*Jour. Bd. Agr.* vol. xix. 1, pp. 27–29).—The life-history of the Pea Moth (*Endopisa nigricana* Stph.), the caterpillars of which are the cause of the so-called worm-eaten peas, is given, and preventive measures are suggested.—*A. S.*

Peach, 'Admiral Dewey' (*Agr. Gaz. N.S.W.* vol. xxiv. pt. vi. p. 530; 1 col. plate).—The fruit of this Peach is of medium size; firm, yellow subacid flesh; early. The tree is a strong grower.

S. E. W.

Peach 'Russell' (*U.S.A. Dep. Agr., Year Book* 1911, p. 429; col. plate).—A seedling which originated in 1890, season mid-August. Much grown in Nebraska and Iowa.—*E. A. Bd.*

Pear 'Ayer' (*U.S.A. Dep. Agr., Year Book* 1911, p. 428; col. plate).—Originated thirty years ago, probably from seed of a 'Seckel' Pear, which it approaches in flavour. Season early August.—*E. A. Bd.*

Pear 'Douglas' (*U.S.A. Dep. Agr., Year Book* 1912, p. 267; col. plate).—A seedling from 'Keiffer,' and which it resembles in many respects, a fact which will be considered no recommendation in this country.—*E. A. Bd.*

Pear Experiments. By Rev. John B. Katzner (*U.S.A. Hort. Soc., Minnesota, Trans.* 1912; pp. 377–382).—The writer, having tried some fifty American and European varieties and found that they could not endure the rigours of the climate, has directed his efforts to raising pears from seed obtained from hardy varieties. His first experimental plot of 200 seedlings were root-killed by a temperature of 40° below zero, though the stems were not injured. Some of these were grafted on apple roots, when they grew readily, and, when transplanted two years later, had grown their own roots and the apple roots were cut away. All except two, however, eventually succumbed. The two are making good trees, and, from experiments made, the writer hopes to be able to grow good varieties of pears on these hardy stocks. In raising pear seedlings in such a severe climate it is necessary to protect them by covering them completely with earth the first two winters, and after that the choosing of the orchard site is a very important matter. Pear trees seem to arrive at their greatest degree of hardiness when they are past their infancy.—*A. P*

Pear Thrips in New York. By P. J. Parrott (*Jour. Econ. Entom.* vol. v. pp. 184-188, April 1912).—*Euthrips pyri* was found attacking pears to an injurious extent in New York, and it was found that spraying with a nicotine wash proved an effective remedy.

F. J. C.

Pears, Oriental, and their Hybrids. By H. R. Cox (*U.S.A. Exp. Stn., Cornell, Bull.* 332, 22 pp.; 16 plates).—An account of the introduction of *Pyrus sinensis* into America, and the hybrids which have been made with the varieties of *Pyrus communis.*

The best-known representative, the 'Keiffer,' is said to be of pleasant flavour when grown in certain localities, but the main reason of the extended culture of this and similar Pears in the United States is their ability to stand the prolonged droughts and hot suns of the Southern States.

Full cultural details are given, gathered from a large area of varying soils and climates, and descriptions of prominent varieties. Of interest from the genetic standpoint as showing the predominating influence of *P. sinensis* in all crosses.—*E. A. Bd.*

Pears, Super-grafting of. By V. Enfer (*Rev. Hort.* pp. 346–347, Aug. 1, 1913).—Records of results of grafting better varieties on such as are already established but found to be unsatisfactory, in this way obviating gaps and improving orchards with saving of time, trouble, and expenditure.—*C. T. D.*

Pecans, New (*U.S.A. Dep. Agr., Year Book* 1912, p. 273; col. plate).—Five new varieties, 'Major,' 'Burkett,' 'Warrick,' 'Flavens,' and 'Owens,' are described and figured. They are all considered worthy of extended trial.—*E. A. Bd.*

Persimmon 'Ormond' (*U.S.A. Dep. Agr., Year Book* 1912, p. 270; col. plate).—A recent variety of uncertain origin having the property of keeping remarkably late.—*E. A. Bd.*

Pescatoria. By A. Malmquist (*Orchis*, vol. vii. pt. vii. pp. 108–109).—Orchids of the *Pescatoria* group have been grown with success on blocks of Acacia. The rough side of the block is covered with a thin layer of fresh Sphagnum, on which the orchid is placed and the whole is fastened with wire to an earthenware plate. A porous compost of equal parts of charcoal, fibrous peat, and Sphagnum is piled up on the plate, which is suspended close to the glass, in a house with a moist atmosphere. In summer a temperature of 64° F. in the shade or 73° F. in the sun is desirable, and 55° F. in winter. Frequent watering should be avoided.—*S. E. W.*

Pilocereus Straussi Hesse. By E. Hesse (*Gartenflora*, vol. lxii. pt. xvii. pp. 383–384; 1 fig.).—This Bolivian cactus loses its woolly covering in cultivation and is clad with spines resembling spun glass in appearance.—*S. E. W.*

Pinus Malletti. By S. Mottet (*Rev. Hort.* pp 263–266, June 1, 1913; 3 ill.).—Apart from a description of this species the illustrations are of interest as showing how magnified sections of the leaves of conifers are capable of determining one closely-allied species from another by the special arrangement of the resin-bearing vessels within them.—*C. T. D.*

Pith-ray Flecks in Wood. By H. P. Brown (*U.S.A. Dep. Agr., Forest Service, Circ.* 215, May 7, 1913).—Investigations have conclusively proved that the so-called pith flecks are caused by the larvæ of a dipterous insect living in the cambium of the wood during the growing season. These flecks or spots often render the lumber unfit for certain uses. Some excellent illustrations are given of timber affected by pith flecks, for which no real remedy has yet been discovered.

A. D. W.

Plant, Skin Irritating (*Agr. Gaz. N.S.W.* vol. xxiv. pt. ix. p. 778).—*Gingko biloba*, the Maiden-hair tree, must be added to the list of plants which may attack the skin. Some persons suffer from a red rash after handling the fruit.—*S. E. W.*

Plum 'Laire' (*U.S.A. Dep. Agr., Year Book* 1911, p. 430; col. plate).—Considered a form of *Prunus orthosepala* brought into cultivation about 1876. A small red fruit which would not be considered worthy of cultivation in Europe, but largely grown in Kansas.

E. A. Bd.

Plum 'Moncelt' (*U.S.A. Dep. Agr., Year Book* 1911, p. 432; col. plate).—A seedling from a Japanese variety, and 'Clyman' a *domestica* form. Has the *triflora* form and foliage. Valued for shipping qualities and resistance to some diseases.—*E. A. Bd.*

Plums, Japanese. By Henry Dunsmore (*U.S.A. Hort. Soc., Minnesota, Trans.* 1912; pp. 5–6).—The writer grew four varieties of these for eight years without producing a single plum, owing to the injury to the trees in winter. He grafted the Satsuma on a head of Aitkin Plum in 1907, with the result that it has suffered practically no injury, and in 1911 produced a heavy crop of highly coloured fruit, while the original tree from which the graft was taken has continued to be cut back each winter.—*A. P.*

Podachaenium eminens (*Bot. Mag.* tab. 8502).—Family *Compositae*, tribe *Helianthoideae*. Central America. Shrub; leaves ovate, up to 9 inches long. Corymbs terminal, leafy. Heads 1–1¼ inch across. Ray-florets white; disk yellow.—*G. H.*

Pollination of Fruit Trees and its Bearing on Planting. By C. H. Hooper (*Gard. Chron.* Dec. 6 and 13, 1913, pp. 393 and 420).—A review of experiments by the author and Messrs. Chittenden and W. Backhouse regarding the order of flowering, self-fertility or sterility of Apples, Pears, Plums, and Cherries. Tests with smeared microscope slides for wind dispersal of pollen and a comparative table of the numbers and kinds of insect visitors.—*E. A. B.*

Potato Scab, The Pathological Anatomy of. By F. Lutman (*Phytopathology*, vol. iii. pp. 255–264, Oct. 1913; fig.).—The American scab of potatos is now usually ascribed to the fungus *Oospora scabies* Thaxter. There appears some doubt as to whether this is a true fungus or a bacterium, but none that it acts upon the cork cambium, stimulating it to hyperplasia and hypertrophy. The present paper deals with the anatomy of the scab in various stages of its development. The organism was not found in the cells of the potato, but one similar in appearance and probably identical with Beijerinck's.

Streptothrix chromogen has been seen many times in surface view of the cork cells. The appearance of cells from under scab suggests that they contain numerous minute bacteria, but the author shows that this appearance is due, not to bacteria, but to very numerous and minute oil globules in the cells. The presence of these bodies appears to be one of the results of the disease, as starch is not contained in the affected area.—*F. J. C.*

Potato Tuber Moth (*U.S.A. St. Com. Hort., Cal., Bull.* May 1912, vol. i. No. 6; 23 figs.).—The principal item in this paper is a description of the Potato Tuber Moth (*Phthoximaea opercella* Zeller) by E. O. Essig. The larvæ of the moth mine the leaves, stems, and tubers of potatos. In the fields, especially while the vines are still green and growing, they work mostly within the leaves and stems. The greatest damage, however, is done to the tubers just before, or just after, they are dug. The moth deposits its eggs on the potatos, and the larvæ, hatching, immediately bore into the tubers at the eye

or through an abrasion in the skin. They eat their way throughout every portion of the tubers, causing complete destruction and decay.

As many as fifty to one hundred larvæ have been found in a single tuber. Growing potatos only in sandy loam and clean culture generally seem to be the best method of control, and it is most necessary to destroy by burning any infested potatos and haulm.—*V. G. J.*

Potatos, Importation of (*Agr. Jour. Cape G.H.* vol. iv. No. 1, July 1912, p. 125).—The Department of Agriculture notified potato importers that after July 1, 1912, potatos imported from oversea would not be sorted as in the past, but would be fumigated with formaldehyde gas. A fee of sixpence a case would be charged for the treatment. The instruction continues: "Any consignment found on arrival to be infected with black scab or warty disease will not be accepted for admittance into the country, and any found infected with bacterial disease may also be excluded. A sworn statement from the consignor setting forth the place of origin of the potatos will be required with respect to each consignment. A statement from the Department of Agriculture of the country of origin certifying that black scab has never been known to exist within five miles of the place of origin will also be required unless the Government of the country of origin has assured the Union Government that the disease named is non-existent in its territory, or unless the consignee produces a certificate from the Government of the country of origin certifying, within a period of nine months, that no case of the disease has been known in the country, shire, or other such territorial division in which the declared place of origin is situated."—*A. A. K.*

Psylla, Pear, Susceptibility of Eggs to Spraying Mixtures. By P. J. Parrott and H. E. Hodgkiss (*Jour. Econ. Entom.* vol. v. pp. 193-194, April 1912).—Lime-sulphur was used at winter strength for the destruction of the eggs of the pear *Psylla*, but the results are mixed up with those obtained by the autumn spraying against the adults, and do not, therefore, appear conclusive.—*F. J. C.*

Quebracho Wood and its Substitutes. By C. D. Mell and W. D. Brush (*U.S.A. Dep. Agr., Forest Service, Circ.* 202, May 23, 1912).—This wood yields a valuable extract which is much used in the tanning of leather. Rarely growing in quantity, the Quebracho is found in isolated specimens four or five to the acre—rarely more. It grows 50–70 feet high and is from 2 to 4 feet in diameter, and the wood weighs 78 lb. per cubic foot, and is remarkably hard, strong, close-grained, and yellowish white in colour with a pretty rosy-pink tinge.—*A. D. W.*

Radio-Action, Influence of, on Germination. By I. Crochetelle (*Rev. Hort.* pp. 484–485, Oct. 16, 1913; 1 ill.).—An interesting article dealing with the stimulating effect of radio-active bodies on the germination of seeds.—*C. T. D.*

Radium and the Growth of Plants. By E. Herrmann (*Die Gart.* March 15, p. 144).—The author reviews the progress made in the forcing of plants. The botanist Johannsen succeeded in shortening the resting period of certain plants through the universally known process of ætherising. Molisch found that the buds of a dormant plant began to develop after a few hours' immersion in lukewarm water. Dr. Weber observed that the bud began to grow after being punctured lightly with a needle. Jesenko succeeded in hastening the growth of woody plants by injections of diluted alcohol or solutions of ether in the severed twigs. Molisch was induced to try the effect of radium on plant organisms by the startling results produced by the same on the human body. In November he cut off some lilac-twigs and inserted the terminal buds of the same in glass tubes containing sealed radium, allowed them to remain from two to three days in a dark room, and then placed them into daylight. The buds which had been exposed to the radium rays began to grow, and the unexposed later or not at all. Buds which had been exposed for 24 hours to chloride of radium began to grow after lapse of a month. Molisch also exposed twigs to radium rays without the glass tubes, and distinct effects were noted. The experiments, however, succeeded only with those twigs which had been cut between the middle of November and the month of December; those cut in September or January were indifferent to the rays. The experiments succeeded with *Syringa*, *Aesculus*, *Liriodendron*, *Staphylea*, and *Acer platanoides*, and were unsuccessful with *Ginkgo*, *Platanus*, *Fagus sylvatica rubra*, and *Tilia*.—*G. R.*

Rafflesia, On the Flower and Fruit of. By A. Ernst and Ed. Schmidt (*Ann. Jard. Bot. Buit.* ser. ii. vol. xii. pt. 1, 1913, pp. 1–58; with 8 plates).—Nearly 100 years ago the first flower of *Rafflesia* was discovered in Sumatra by Sir Stamford Raffles and his companion Dr. J. Arnold. The botanist Robert Brown named the plant from which this bloom was obtained *Rafflesia Arnoldii*. Since then much has been written on the Rafflesias and their allies, notably by Count Solms-Laubach. The present communication forms a welcome addition to our knowledge of these phanerogamous parasites. The most thoroughly examined species was *R. Patma* Bl., whilst *R. Rochussenii* T. and B., and *R. Hasseltii* Sur. were studied for comparison with the former.

The question of the distribution of the sexes in these plants has been long uncertain. Whether the male and the female reproductive organs appear in separate flowers, or in one and the same flower, and whether, if the flowers should prove to be unisexual, the plants are monœcious or diœcious, required careful study. The authors found that all the three species which they examined possessed unisexual flowers, but whether the plants were monœcious or diœcious they could not determine with certainty. "A decision regarding this question can only be reached by way of experiment."

The anthers of *Rafflesia* possess no fibrous cells in their wall such as the majority of Phanerogams exhibit. The cytological facts associated with the development of the pollen grains were followed in some detail. The reduced number of chromosomes in this plant (*R. Patma*) was found to be twelve. In most Dicotyledons two nuclear divisions take place in the pollen-mother-cell before a cell division is accomplished, but in the Rafflesias a cell division at once follows the first nuclear division of this cell.

The generative cell of the pollen grain is at no time clearly cut off from the vegetative cell. The surface of the pollen membrane is perfectly smooth, without spines, sculpture, or definite germ-pores. The tapetum of the anther does not break down until late in the life of the anther. In this respect it differs notably from the tapeta of most Angiosperms, but resembles that of *Ipomoea* examined by the present abstractor.

The gynæcium of *Rafflesia* exhibits no actual carpels and no uniform ovarial cavity.

In quite large flower-buds and even in open flowers the ovules are still at a very early stage of development. They only complete their development after pollination. The ovule possesses only a single complete integument, whilst the outer integument is reduced to an inconspicuous rudiment.

The development of the embryo sac takes place in quite the normal and usual manner.

There is reason to believe that the flowers are insect-pollinated. The development of the embryo was carefully followed, but exhibited no remarkable features. The ripe seeds of *R. Patma* possess from 30 to 40 endosperm cells. The food-reserve in these, as well as in the cells of the embryo itself, chiefly consists of oil.

Quite a number of fruits of *Rafflesia* were collected by the authors. The seeds are only set free by the decay of the fruit. They are distributed through the agency of animals, to the feet of which the sticky mass of decayed fruit and seeds becomes attached.—*R. B.*

Ramularia, Mycosphaerella, Nectria, Calonectria. By H. W. Wollenweber (*Phytopathology*, vol. iii. pp. 197–242, Aug. 1913; plates).—This is a morphological study of fungi with cylindrical or sickle-shaped conidia, including many parasitic forms.—*F. J. C.*

Raspberry Horntail (*Hartigia abdominalis*) (*U.S.A. St. Com. Hort., Cal.* vol. i. No. 12, Nov. 1912; 13 figs.).—This is a comparatively new pest to come under notice. The adult insect belongs to the Hymenoptera and the family Siricidae. The larvæ destroy young new growth by boring spirally around and down the canes, causing them to die in a few days.—*V. G. J.*

Red-Oak and Hard-Maple Crossties, Experiments in the Preservative Treatment of. By Francis M. Bond (*U.S.A. Dep. Agr., Forest Service, Bull.* 126, May 26, 1913).—These were carried

out in order to secure the most complete records for future use of the value of creosote and other preservatives when applied to timber that is intended for railroad constructive purposes. The results are carefully tabulated and the numerous illustrations help greatly in elucidating the text of this useful pamphlet, which runs into some ninety-two pages.—*A. D. W.*

Redwood, Mechanical Properties of. By A. L. Heim (*U.S.A. Dep. Agr., Forest Service, Circ.* 193, November 1, 1912).—The timber of the redwood is used for all kinds of constructional purposes, for ties, shingles, paving blocks, and tank and pipe stores. It resists fire well, and even when ignited burns slowly, while the absence of resin renders it peculiarly suitable for building purposes. Various useful tables are appended.—*A. D. W.*

Rhododendron caucasicum 'Chimaera.' By M. Loebner, Dresden (*Die Gartenw.* July 5, p. 366).—In an exceedingly interesting article, Herr Loebner, of the Dresden Botanic Garden, gives the history of the origin of the above "graft-hybrid." The Rhododendron originated from a graft of *R.* 'Madame Linden' on *R.* 'Cunningham's White.' Just underneath the junction of the graft with the stock a shoot was allowed to bloom unheeded, resulting in a flower which is a mixture of both, a highly interesting Chimaera. The colour is a tender lilac-rose in the face of the white of *R.* 'Cunningham's White,' and the vivid lilac-rose and the strongly defined blood-red marking of the top petal. *R.* ×*Chimaera* shows the colour and marking of the last named, but in a much paler degree. On several twigs the leaves of 'Cunningham's White,' when carefully examined, are found to be sinuated on the edges similarly to oak-leaves. With *R.* ×*Chimaera* this is still more conspicuous. *R.* 'Cunningham's White' flowers from ten to fourteen days earlier than 'Madame Linden,' and *Chimaera* flowers between the two.—*G. R.*

Rhododendron harmalocheilum (*Bot. Mag.* tab. 8518).—Family *Ericaceae*, tribe *Rhodoreae*. China. Shrub. Leaves 3 inches long. Flower expanding nearly blood-red. In expanded state a rich carmine, gradually fading.—*G. H.*

Rhododendron nigropunctatum (*Bot. Mag.* tab. 8529).—Family *Ericaceae*, tribe *Rhodoreae*. China. Shrub, very dwarf, 8–10 inches high with a neatly rounded crown. Leaves persistent, $\frac{2}{5}$ inch long. Flowers $\frac{3}{4}$ inch across; pale purple, 1 inch across.—*G. H.*

Rhododendron setosum (*Bot. Mag.* tab. 8523).—Family *Ericaceae*, tribe *Rhodoreae*. Eastern Himalaya. Shrublet, about 1 foot high. Leaves oblong, $\frac{1}{2}$ inch long. Corolla rose-purple; lobes $\frac{1}{2}$ inch long. *G. H.*

Ribes sanguineum splendens. By R. Barbier (*Rev. Hort.* pp. 428–429, Sept. 16, 1913; plate).—The plate shows a brilliantly

coloured inflorescence, which is described as superior to all varieties previously in garden use having numerous long bunches of flowers, the colour of which is compared to that of the Rose 'Ulrich Brunner,' or perhaps even brighter. Reached France from Ireland.—*C. T. D.*

Rosa berberifolia Hardii. By Paul Hauschitz (*Die Gart.* May 17, p. 273).—A beautiful climbing Rose, still comparatively unknown to cultivation, is *R. berberifolia Hardii*, the result of a cross between *R. simplicifolia* × *R. clinophylla*. The author ascribes its scarcity to its somewhat delicate constitution. It has very fine serrated, pretty, dark bluish-green leaves. The flowers appear in bunches of three and four together on stalks from 15 to 20 cms. long, and resemble those of *Cistus formosus* in their colour and texture. For this reason it is often called the Cistus Rose.—*G. R.*

Rosa foliolosa (*Bot. Mag.* tab. 8513).—Family *Rosaceae*, tribe *Roseae*. North America. Shrub of dwarf habit, 1–1½ foot high, very few prickles. Leaves 2–3 inches long; leaflets 7–9, lanceolate. Flowers 2–2½ inches across, crimson.—*G. H.*

Rose 'Candeur Lyonnaise.' By D. Bois and G. T. Grignan (*Rev. Hort.* p. 468, Oct. 16, 1913).—This rose is described as, without doubt, the largest and finest of the white Roses which have so far appeared either for glass or the open. It has received a gold medal and other high awards. Raised by M. Croibier-Venissieux (Rhone).—*C. T. D.*

Rose, H. T. 'Minister Daranyi.' By Borsos (*Oestr. Gart. Zeit.* vol. viii. pt. xi. pp. 310–311; 1 fig.).—'Minister Daranyi' was obtained by fertilizing 'White Lady' with 'La France.' The flowers have a good shape and a decided perfume. They are delicate pink with a yellow ground. The cut blooms last a fortnight before falling.

S. E. W.

Roses, New. By Kache (*Gartenflora*, vol. lxii. pt. xvi. pp. 362–368).—The following new roses are recommended. 'Yellow,' 'Sunburst,' 'Mme. Charles Lutaud,' 'Herzogin Marie Antoinette,' 'Dad Sterling' (vigorous, good-shaped flowers, sweet scent), 'Sénateur Mascuraud,' 'Souvenir de Gustav Prat' (vigorous and sweet scented), 'Stadrat Glaser' (vigorous, healthy, and floriferous), 'Natalie Bottner' (vigorous, healthy, large well-shaped flowers, good for cutting). The best reds are 'President Vignet,' 'Lieutenant Chauré,' and 'Château de Clos Vougeot.'

'Maman Lyly' is of moderate growth, healthy, and bears flesh-coloured flowers with pink reflex, which are rather flat. 'Tito Hékékyan' is a strong grower, with sweet-scented copper-pink flowers. 'Mme. Lucien Baltet' is vigorous, and has flesh-coloured blooms with golden centres suffused with carmine. 'Jonkheer J. L. Mock' and 'Lili von Posern' are silvery pink. 'König Laurin' resembles 'Maman Cochet' in shape, but the centre of the flower is milk-white, passing to pink at the edges.

'Louise Catherine Breslau' is the best Pernettia rose, resisting mildew and disease. The buds are oval and the flowers are copper suffused with orange. 'Deutschland,' a vigorous grower, has golden flowers suffused with pink and orange. 'Juliet' is not free-flowering, but the blend of gold, orange, pink, and red is charming. 'Viscountess Enfield' and 'Arthur R. Goodwin' are also good.

The best of the Polyantha are 'Maman Turbat,' 'Jeanne d'Arc,' 'Mrs. Taft,' 'Orleans Rose,' and 'Jessie.'

'Sodenia,' 'Eisenach,' and 'Fräulein Octavia Hesse' are the best of the new Wichuriana roses.—*S. E. W.*

Salvia nemorosa, Hardy European Species. By S. Mottet (*Rev. Hort.* pp. 470–472, Oct. 16, 1913; 1 ill.).—Highly recommended for autumn blooming. Forms a bush about 2½ feet high with abundant spikes of large blue flowers. There is a pure white variety, *S. n. alba*, not too tall, but equally floriferous, also recommended.—*C. T. D.*

Sand Hills, Forestation of the, of Nebraska and Kansas. By C. G. Bates and R. G. Pierce (*U.S.A. Dep. Agr., Forest Service, Bull.* 121, February 3, 1913).—This is a record of the reclaiming of sand dunes by means of suitable tree and shrub planting.

Many species of grasses would appear to take possession of the sand-hills once shelter is afforded. It is interesting to compare the list of trees and shrubs that have been found suited for the sea coast of Nebraska and Kansas with those that have been found at home on our own exposed coasts. The illustrations of planting are very instructive.—*A. D. W.*

Saponaria ocymoides versicolor. By Ph. de Vilmorin and A. Menuissier (*Rev. Hort.* pp. 303–304, July 1, 1913; 1 ill.).—The illustration represents *S. ocymoides* as a very compact bushy and floriferous addition to rockery plants when in congenial unrestricted conditions. Interesting details from the Mendelian point of view are given of the hybrid origin of *S. o. versicolor*, and the result of crossing it with a white form found wild, the F_1 being all versicolor and F_2 yielding some of the white.—*C. T. D.*

Schizophragma hydrangeoides (*Bot. Mag.* tab. 8520).—Family *Saxifragaceae*, tribe *Hydrangeae*. Japan. Shrub, deciduous, climbing by aerial roots to 40 feet in height. Leaves opposite 2–5½ inches long. Flowers in a cymose terminal corymb 4–8 inches wide. Perfect flowers very small, crowded. Sterile flowers confined to the margin, each reduced to a solitary, creamy-white bract 1¾ inch long.—*G. H.*

Sedum pilosum (*Bot. Mag.* tab. 8503).—Family *Crassulaceae* Caucasus and Armenia. Succulent herb 2–3 inches high. Leave oblong, ⅔ inch long. Flowers clustered, corymbose, ¾ inch across Corolla rose-pink.—*G. H.*

Seed Collecting (*U.S.A. Dep. Agr., Year Book* 1912, pp. 433–442 ; 4 plates).—A most instructive account of methods used in collecting forest tree seeds. The winter hoards of squirrels offer a ready source of fir cones. An example of the magnitude of the work carried on was the gathering of 20,000 bushels of cones of *Pinus monticola* in 1911. A very readable and interesting article.—*E. A. Bd.*

Seed Sterilization. By Ivy Massee (*Jour. Bd. Agr.*, vol. xx. No. 9, pp. 796–801 ; 2 plates).—De Zeeuw, Pinoy, and Magrou having shown the efficacy of hydrogen peroxide ($H_2 O_2$) as a sterilizing agent the author was led to experiment with a view to ascertaining its action on fungus spores and on the germination of seeds, as it appeared probable that this substance would prove of value in preventing the spread of plant diseases by fungus spores on seeds.

Seeds of twelve plants and spores of eleven species of fungi were tested. The hydrogen peroxide used was that known as " commercial, 10 vols.," and was not diluted.

None of the fungus spores experimented with germinated after immersion for two hours.

All the seeds, however, were capable of withstanding immersion for four hours, and seven sorts were not killed by immersion for twenty-four hours.

In nearly every instance the germination of the treated seeds was retarded, seeds immersed for four hours being on an average one or two days later in appearing above ground than untreated seeds of the same kind. After treated seeds have germinated growth is rapid, and in a short time the plants are equal in size and vigour to those from untreated seeds.

" For all practical purposes, soaking seed in hydrogen peroxide for three hours will kill all superficial fungus spores and the seed will not be injured."—*A. S.*

Senecio Kirkii (*Bot. Mag.* tab. 8524). — Family *Compositae*; tribe *Senecionidae*. New Zealand. Shrub, 7–15 feet high. Leaves variable, linear oblanceolate, $1\frac{1}{2}$–$4\frac{1}{2}$ inches long. Corymbs 4–12 inches across. Heads numerous, $1\frac{1}{2}$–2 inches wide. Ray-florets about 10, white. Disk florets yellow.—*G. H.*

Shade Trees, Pests of. By A. F. Burgess (*Jour. Econ. Entom.* vol. v. pp. 172-178, April 1912 ; plates).—An account is given of the spraying of trees in towns. The author also gives estimates of the cost of machines and of labour, and recommends the immediate attention of town authorities to trees that are in the least affected by pests. He points out that it is often cheaper to spray trees than to remove them after they are dead from the attacks that have been neglected.—*F. J. C.*

Shade Trees, Three Pests of. By G. W. Herrick (*Jour. Econ. Entom.* vol. v. pp. 169-172, April 1912) —The elm-leaf beetle (*Galerucella luteola*) was kept in check by spraying with lead arseniate at a

cost of 88 c. each tree; 530 trees, many of them very scattered, were sprayed. The elm sawfly leaf-miner (*Kaliosysphinga ulmi*) was attacked very successfully by the use of a contact wash. The larch case-bearer (*Coleophora laricella*), which hibernates in the larval form, was attacked by spraying with lime-sulphur (29 degrees Baumé, diluted with seven times its volume of water). The spraying was done just when the larvæ began to move, and it was found that at this stage they were effectively checked.—*F. J. C.*

Silver-leaf Disease. By F. T. Brooks (*Jour. Bd. Agr.*, vol. xx. No. 8, pp. 682–690; 5 plates).—The author, who has conducted a number of inoculation experiments, concludes that whilst silvering of the foliage is a manifestation of ill-health which may be due to different causes, it is usually caused in the case of fruit trees by the fungus *Stereum purpureum.*

The disease is fully described, and the various means by which trees may become infected are indicated. It is pointed out that *Stereum purpureum* must be looked upon as a potential agent in causing silver-leaf on whatever substratum it may be found; *e.g.*, fruits of the fungus taken from a silvered Laburnum will cause silver-leaf in Plums, and vice versa, and it has also been shown that fructifications taken from a dead Birch stump in the midst of a wood are as effective in causing the disease as those taken from a silvered Plum tree.

The treatment advised consists entirely of preventive measures, for whilst "other kinds of treatment have been suggested for the amelioration of silvered trees, up to the present time none of them have been commercially successful when tried on a large scale." "Cases of natural recovery of trees which are slightly silvered are not infrequent," and "in view of the possibility of recovery without treatment it is difficult to lay any stress on the results of experiments which have not been carried out on a large scale."—*A. S.*

Soil, Investigations on "Sickness" in. I. — Sewage Sickness. By E. J. Russell and J. Golding. **II.—In Glasshouse Soils.** By E. J. Russell and F. R. Petherbridge (*Jour. Agr. Sci.* v. pp. 27–47, 86–111; Oct. 1912; plates).—In the former article the condition of the soil of a sewage farm, in which the sewage failed to percolate satisfactorily and the effluent came through less pure than formerly, is discussed. Three causes for the trouble are shown to exist, but the authors appear to attach the greatest weight to a biological factor which checks the increase of bacteria in the soil. This factor can be removed by treatment of the soil with any volatile antiseptic (toluol and carbon bisulphide were used in the experiments) with excellent results, both in the laboratory and on a large scale.

In the second paper the well-known phenomenon of "sickness" in glasshouse soils in which tomatos and cucumbers had been growing was investigated. The authors consider the "sickness" to be due to

the accumulation of insects and fungus pests in the soil and to a lowering of bacterial efficiency. They failed to discover in the sick soils any substances toxic to plants or bacteria, and there was abundance of plant food present in the soil. Further they found that heat and antiseptics checked the factor detrimental to bacterial activity, and show that soil sickness in tomato and cucumber houses can be effectually treated by partial sterilization of the soil.—*F. J. C.*

Solenostemon Godefroyae (*Bot. Mag.* tab. 8511). — Family *Labiatae*, tribe *Ocymoideae*. Congo and Angola. Herb, 2 feet high. Leaves $\frac{3}{4}$–$1\frac{1}{4}$ inch long. Racemes 6–8 inches long. Whorls somewhat separated. Corolla $\frac{1}{3}$ inch long, blue.—*G. H.*

Spraying. By W. J. Allen (*Agr. Gaz. N.S.W.* vol. xxiv. pt. v. pp. 431–436).—Success in the orchard largely depends on cultivation, manuring, pruning, and spraying. Spray every season, following the directions in the Spray calendar. Use fungicides early in the spring as preventives. Spray every tree, and do not forget the under-sides of the leaves.—*S. E. W.*

Stanhopea convoluta (*Bot. Mag.* tab. 8507).—Family *Orchideae*, tribe *Vandeae*. Colombia. Herb, epiphytic. Leaves 12–14 inches long, $3\frac{1}{2}$–$5\frac{1}{2}$ inches wide. Scapes 2-flowered. Sepals spreading, elliptic, $2\frac{3}{4}$ inches long; $1\frac{3}{4}$ inch broad, buff. Petals connivent, enveloping the column, 2 inches long. Labellum 3-lobed, fleshy, $1\frac{1}{2}$ inch long, orange.—*G. H.*

Stanhopea grandiflora (*Bot. Mag.* tab. 8517).—Family *Orchidaceae*, tribe *Vandeae*. Ecuador. Herb, epiphytic. Leaves 10–12 inches long. Scape pendulous 6–8 inches long. Flowers large, showy, yellowish with purple blotches. Lip white, 5 inches across.—*G. H.*

Strawberry 'Chesapeake' (*U.S.A. Dep. Agr., Year Book* 1912, p. 269; col. plate).—A late variety of excellent flavour and good "shipping" qualities.—*E. A. Bd.*

Streptocarpus cyaneus (*Bot. Mag.* tab. 8521).—Family *Gesneraceae*, tribe *Didymocarpeae*. Transvaal. Herb, perennial or sub-biennial under cultivation. Leaves many, radical $2\frac{1}{2}$–$8\frac{1}{2}$ inches long. Scapes 3–6 inches long. Corolla, tube $1\frac{1}{4}$ inch long, white; limb with sub-unequal lobes $\frac{1}{3}$–$\frac{1}{2}$ inch long, rose-mauve or pink.—*G. H.*

Streptocarpus orientalis (*Bot. Mag.* tab. 8526).—Family *Gesneraceae*, tribe *Cyrtandrae*. Siam. Herb, 6–16 inches high. Leaves opposite, $3\frac{1}{2}$ inches long. Inflorescence cymose. Corolla, purple.—*G. H.*

Substitutes for the Larch. By A. D. Webster (*Gard. Mag.* No. 3099, p. 202; March 22, 1913).—Many substitutes have been suggested and tried for the larch, but the writer is strongly of opinion, after thirty years of observation and note-taking, that the larch has no equal as a profitable coniferous tree in this country. Even the wood in its young stages is of value, whereas with age the trunk is

generally straight and free from knots ; it wastes little substance in the formation of side branches, while a greater weight can be obtained from a given area than of any other conifer, excepting, perhaps, the native Scots pine. The timber is extremely light, yet twice as durable as other conifers.

Experiments with the Douglas fir prove that it does not compare with the larch, while the Corsican pine, though hardy and of very rapid growth, is difficult to transplant, and produces a too heavy resinous wood, not so durable as could be desired. For profitable planting the Scots pine comes next to the larch ; it is cheap and easily transplanted, perfectly hardy, and produces a large quantity of fairly valuable timber. The tree is little subject to disease, covers a vast range of soils, and will produce excellent timber on those of a poor gravelly nature.—*E. B.*

Sugar-Beet Web-worm, The. By H. O. Marsh (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 109, pt. vi. ; Sept. 1912 ; 15 figs.).—The author considers the following formulæ most efficient in dealing with this pest :—

(1) 3 lb. Paris green, 6 lb. whale oil soap, 100 gallons water.

(2) 3 lb. Paris green, 3 lb. lime, 100 gallons water.—*V. G. J.*

Sugar Cane, Red Rot of. By E. J. Butler and A. H. Khan (*Mem. Dep. Agr., India, Bot. Ser.* vol. vi. pp. 151–178 ; Oct. 1913 ; plates).—The authors show that the red rot of sugar cane, due to *Colletotrichum falcatum*, is mostly spread by means of infected sets, that by choosing sets from healthy stocks the disease may be almost entirely avoided, and that many of the Indian varieties are very esistant to the attack of the fungus.—*F. J. C.*

Sulphur-Arsenical Spray Injury. By J. P. Stewart (*U.S.A. Hort. Soc., Virginia, Rep.* 1912, pp. 245–254).—The recent extensive use of lime-sulphur solutions in combination with the ordinary lead arseniates as a summer spray has resulted in widespread complaints of injury. The precautions to be adopted which are here suggested are based primarily on the results of tests and experiments during the past four years, though the investigations are not yet completed.

A. P.

Sweet Peas, Asters, and Other Plants, A Disease of. By G. Massee (*Bull. Roy. Bot. Gard., Kew* ; No. 1, 1912, pp. 44–52 ; plate). The parasite concerned is *Thielavia basicola* Zopf. Its morphology is dealt with, and in addition to the *Torula* stage, which is the one usually present on diseased material, the conidial (*Milowia*) and ascigerous stages are figured.

" Excluding trees and woody plants the fungus appears to be practically omnivorous," although in this country Asters and Sweet Peas have suffered most. Asters, when attacked by this fungus, are always, in the author's experience, killed outright in the seedling stage. In the case of Sweet Peas a " very common symptom of the disease

is known to growers under the name of 'streak' or 'stripe,' characterized by the presence of dingy yellow streaks or stripes on the leaves and stem."

Infected soil is the usual source of injury, the fungus being capable of passing through its complete course of development as a pure saprophyte, feeding on the humus present in the soil. "The infection of a new area is in the majority of instances due to the use of manure, on which material the fungus flourishes and reproduces itself at a rapid rate."

"Commercial formalin (= 40 per cent. formaldehyde) has proved to be the most effective fungicide for sterilizing infected soil. In the United States, where *Thielavia* proves very destructive in causing a root-rot of tobacco seedlings, the soil of the seed-beds is thoroughly soaked with a solution of formalin in water, in the proportion of one pint of formalin to twelve gallons of water. One gallon of the mixture should be allowed for each square foot of surface. After watering is completed the soil should be covered for two or three days with coarse sacking or canvas, to keep in the fumes. The watering should be done after all digging has been done, and when the seed-beds are in a condition ready for sowing, and a week or ten days should intervene between the soaking of the soil and the sowing of the seed, to allow for the complete escape of the formalin fumes and the drying of the soil."—*A. S.*

Sweet Potato, Foot Rot. By L. L. Harter (*Phytopathology*, vol. iii. pp. 243–245, Aug. 1913; figs.).—A new disease of sweet potatos characterized by the yellowing and death of the lower leaves and the blackening of the lower part of the stem; the roots are also caused to rot. The fungus producing the disease is apparently a new one and is named *Plenodomus destruens*.—*F. J. C.*

Thrips, The Greenhouse. By H. M. Russell (*U.S.A. Dep. Agr., Bur. Entom., Circ.* 151; July 1912; 7 figs.).—Fumigation with nicotine or hydrocyanic gas, spraying with nicotine liquids and kerosene emulsion are the usual methods of control, and frequent treatment with a stiff spray of water from a garden hose or syringe will tend to keep this insect down. Whatever method is employed, it should be repeated in from seven to ten days to destroy the young larvæ that have hatched from the eggs. This should be sufficient, but it may be advisable to give a third treatment in another week or two.—*V. G. J.*

Tobacco Breeding in Connecticut. By Hayes, East, and Beinhart (*U.S.A. Exp. Stn., Conn., Bull.* 176, 68 pp.; 11 plates).—Treats with great minuteness the problem of the production of an improved tobacco for cigar wrapping. The results are generally Mendelian, but the large number of characters concerned make it a long and difficult task to associate those desired.

A summary of previous work with tobacco plants is given.

E. A. Bd.

Tobacco Extracts, their Comparative Value as Insecticides. By W. O. Hollister (*Jour. Econ. Entom.* vol. v. pp. 263–267; June 1912).—Tobacco water has been in use for about 150 years as an insecticide, and is now finding greater favour than ever before. As a result of experiments carried out by the author it is recommended that solutions of pure nicotine (up to 2 per cent. solution) should be used for spraying in preference to the impure solutions containing various foreign bodies, for with this even delicate flowers may be sprayed without fear of injury. Nicotine sulphate has no advantage in use over pure nicotine.—*F. J. C.*

Tomato Culture in Victoria. By S. A. Cook (*Jour. Agr. Vict.* June 1913, pp. 342–346). The factory prices for 1911, 1912, and 1913 average 1*s.* 6*d.* a bushel. Requisites for a market tomato are early ripening, smooth skin, solid flesh, size large to medium, productive and free from surface cracks in wet weather, colour bright red. For market it is desirable to grow three or four varieties.—*C. H. H.*

Tomato Diseases and Pests. By W. J. Goverts (*Gartenflora*, vol. lxii. pt. xx. pp. 440–444; 3 figs.).—The tomato is attacked by numerous pests. The eelworm is very destructive. Remove the soil and mix with quicklime, replace with good loam in which plant pieces of potato to act as traps. When plants are attacked by *Septoria lycopersici*, *Mycosphaerella citrullina* or *Phytophthora infestans* spray with 3 per cent. Bordeaux mixture and sprinkle the ground with quicklime. After the crop is garnered burn the plants and singe the stakes to which they were attached. As a preventive, steep the seed in a 10 per cent. solution of copper sulphate for two hours before sowing. When there is a sudden rise in temperature with bright sunshine in June, plants raised in hot-beds are often attacked by "mosaic" disease. The leaves are marked with yellow patches and have a blistered appearance. If the hot weather is followed by heavy rains, then *Cladosporium fulvum* attacks the tomato. Burn the diseased plants and paint the glass of the lights with lime.

To check chlorosis, give the plants dry soil and discontinue the supply of liquid manure until the plants recover. As a protection against root-knot eelworm, *Heterodera radicicola*, plant lettuce between the tomatos. In May or June remove and burn the lettuce. *Desiantha novica* is caught on white paper smeared with a sticky substance placed under a lantern. Hoe the ground and spray with arsenical preparations. *Macrosporium lycopersici* and *M. solani*, *Didymella superflua*, *Lophostoma similiana*, *Bacterium solanacearum*, *Phytophthora infestans*, *Gloeosporium phomoides* and *Fusarium erubescens* are destroyed by Bordeaux mixture. Burn diseased fruit. In the case of *Fusarium solani* burn the plants and dig in lime. The grubs of the cockchafer and Colorado beetle are destroyed by sprinkling with Schweinfurth green. Fumigating with tobacco removes thrips, and dusting with a mixture of insect powder and

flowers of sulphur gets rid of green fly. Millipedes and earwigs may be trapped in hollow bones or pieces of potato.—*S. E. W.*

Utricularia longifolia (*Bot. Mag.* tab. 8516).—Family *Lentibulariaceae*. Brazil. Herb, densely tufted, stolons numerous; with slender filiform bladder-bearing rhizoids. Leaves linear-lanceolate, 12 inches long. Flowers 10 or less. Corolla bright purple, 1½ inch across.—*G. H.*

Variation and Environment. By C. T. Druery (*Gard. Mag.* No. 3114, p. 492; July 5, 1913).—How "sports" arise we cannot attempt to explain, and to those who have carefully studied the phenomena presented by our native ferns it is, at any rate, perfectly clear that variation occurs quite independently of environment or change of environment. At the same time there are, no doubt, cases where change of environment has caused plants to assume different habits. The writer regrets that the natural sports of our native ferns have not been more carefully studied, a work made easier because of the extensive collections of dried and living specimens which are in existence.

The majority of these sports are found growing under precisely the same conditions as the innumerable normals among which they appear; hill-sides removed from cultural influences have afforded hundreds of these discoveries, and yet the conditions here must have been the same for ages. Examples are given of certain wild forms, which are cultivated in varied environments, yet the spores of these in every case produce the same "sports," often in definite proportions, repeated sowings giving the same results from whatever source the spores are obtained.—*E. B.*

Variation and Environment. By J. E. Simms (*Gard. Mag.* No. 3119, p. 602; August 9, 1913).—The student of plant variability is working almost in the dark, striving to construct something solid from the hazy nebula of theory—glimmers of light are at best feeble and flickering, and may be positively deceiving. We often hear it advanced that in plants there is an inherent tendency to vary—the author believes the direct opposite to be the case. No varietal difference ever occurs as the result of an innate directive force specially applied to that end; the natural tendency is to preserve constancy and stability of a species. "Breaks" are attributable to some outside influence; some wild species in their native habitat seem more inclined to vary than others. In suggesting what the modifying agents may be we must not forget that it is possible such influences may have been operating for untold ages, and that varieties sprang into existence in greater numbers in the early stages of evolution, when structure was more simple. Thus ferns would be expected to depart from the normal type more than flowering plants, so also mosses and lichens. The idea that environment is capable of effecting permanent change is discarded; the variety-forming influence often selects one specimen from amongst many growing under the same

conditions. It seems we can only account for the phenomenon by supposing that a chemical disturbance and rearrangement takes place in the protoplasm of the seed germ or spore, and that morphological changes ensue as a natural consequence; and in this way it is thought that the chemical action of light may play a part, by exercising a peculiar influence upon individual cells and subsequent growth.

E. B.

Variation Curves of Cornus and Aucuba. By M. Nieuwenhuis von Uex Küll-Güldenband (*Beih. Bot. Cent.* xxx. Abt. 1, Heft 1, pp. 105-113). After giving particulars of his own and other enumerations of the number of flowers is an inflorescence in *Cornus mas*, the author shows that there are in most inflorencences minute flower-buds which have failed to develop. In fact, for statistical researches, this plant is quite useless.

But *Aucuba japonica* is more suitable; he gives seven tables in which the results in some 4000 cases are detailed. These show that the maxima of the curves are on the odd numbers. Female shrubs have fewer flowers than the male but are otherwise similar. Higher numbers of the median were found in 1911 as compared with 1910. He also found that there is a different system of developments in the inflorescences, as compared with the flowers themselves and the leaves of the flower axis.—*G. F. S. E.*

Vinca difformis (*Bot. Mag.* tab. 8506).—Family *Apocynaceae*, tribe *Plumerioideae*. Under-shrub, evergreen and dwarf. Leaves ovate, $2\frac{3}{4}$ inches long. Flowers solitary, blue.—*G. H.*

Vines. By M. Blunno (*Agr. Gaz. N.S.W.* vol. xxiv. pt. vii. pp. 605–614; 16 figs.).—The pruning of old vines growing in Australia is illustrated by diagrams.—*S. E. W.*

Volga and in the Caucasus, Recollections of my Journeys on the. By Emil A. Meyer (*Die Gartenw.* March 22, p. 157, March 29, p. 169, and April 5, p. 190).—The author gives a very interesting account of his journey in the Volga region and in the Caucasus, starting from Moscow and travelling *via* Nishni Novgorod. In a pleasant, dispassionate manner, he describes the state of the land and its people in relation to agriculture and horticulture. He finds the banks of the Volga, with its endless orchards, very monotonous. A vast quantity of water melons and tomatos are grown on the fields around Saratov. From Saratov the author proceeds to Zarayn, where the steppe region begins. A large number of birds are to be found here, particularly pelicans, geese, swans, and occasionally flamingos. The climate of Astrachan, the capital of its province, is one of extremes. In summer the average temperature is from 37° to 38° Centigrade in the shade, and in winter the thermometer commonly registers from −25° to −30° C., but in spite of this the vine, peach, apricot, quince, apple, and pear thrive splendidly, without mentioning the water melon, which is very

popular here. The Horticultural Society of Astrachan is tireless in its endeavours, and employs on its staff an agricultural specialist, two entomologists, and one specialist for valuing the fruit crops, and expends from 75,000 to 120,000 roubles yearly. Both horses and camels are employed in working the ground. In the Botanic Garden at Tiflis splendid specimens of *Sterculia platanifolia* and *Broussonetia papyrifera* were noted. Behind the station of Fedschenko in Tiflis on the marshy places a very rare bog-moss used to be found, *Sphagnum batumense*, but, the ground having been built on since then, the moss is totally extinct. A quantity of tea is grown here and gives four harvests, while in China from two to three harvests is the most. The plantations, which yield 200,000 lb. of tea yearly, are superintended entirely by Chinese. Bamboos are grown for the manufacture of furniture and are used also as water-pipes. The leaves are used as a substitute for raffia, the side twigs for brooms; and the young shoots are eagerly eaten as a vegetable. Other valuable agricultural or commercial plants grown in large numbers are *Gardenia florida* and *Olea fragrans* for the perfumes which they produce, *Rhus vernicifera* and *Böhmeria nivea* for paper. Russian banknotes are always printed on this paper.

In Suchum the exceptionally severe winter of 1909–10 had killed the splendid Eucalyptus trees to the ground. The next year, however, strong shoots began to grow rapidly from the base.—*G. R.*

Wahlenbergia, Australian and New Zealand Species of. By N. E. Brown (*Gard. Chron.* Nov. 8, 15, and 22, pp. 316, 336, 354).—A revision. *W. gracilis* is stated to cover at least six distinct species, the others being *W. quadrifida*, *W. multicaulis*, *W. vincaeflora* and two others, possibly referable to *W. Sieberi*, *W. simplicicaulis* or *W. Piessii*. *W. saxicola* is also split into two, *saxicola* found in Tasmania and *W. albomarginata* in New Zealand. New varieties are given, viz. *W. albomarginata* var. *pygmaea*, *W. multicaulis* var. *dispar*, *W. vincaeflora* var. *littoralis*.—*E. A. B.*

Walnut, Circassian. By George B. Sudworth and Clayton D. Mell (*U.S.A. Dep. Agr., Forest Service, Circ.* 212, January 25, 1913).—A comprehensive account of the Circassian Walnut (*Juglans regia*), which in reality is the tree commonly cultivated in this country. Probably the present name, as the tree is a native of the Western Caucasus, is more appropriate than that bestowed on the tree by Linnaeus. For furniture of the best quality walnut is the most popular wood, while for gunstocks it is largely in use. Many substitutes for real walnut have appeared on the market.—*A. D. W.*

Walnut Pest, Serious (*Ephestia elutella* Hubn.). By Frederick Maskew (*U.S.A. St. Com. Hort., Cal., Bull.* i. 8, July 1912; 14 figs.).—This insect is recorded as being cosmopolitan in distribution, and was first noted in California through a shipment of walnuts from Manchuria. The white cocoons were visible on the

outside of the bags, and fumigation was promptly resorted to. The moth is a near relative of the flour moth (*E. Kuehniella* Zeller) and the dried currant moth (*E. cantella* Walker), both very destructive pests. The eggs are laid in small clusters on the walnut shells and are hardly visible to the naked eye. The larvæ enter the shell at the stem end, where the two half-shells meet, and feed upon the kernel, completely destroying it.—*V. G. J.*

Western Hemlock, Mechanical Properties of. By O. P. M. Goss (*U.S.A. Dep. Agr., Forest Service, Bull.* 115, January 18, 1913).—The timber of this tree, which is principally used for barrels and boxes for shipping foodstuffs, is odourless and tasteless, while it is fairly strong and light for its bulk. Many interesting tests have been carried out with the timber which show that it is valuable for a great variety of purposes; but dry rot, to which it is addicted, restrains its more extreme utility for purposes where lasting properties are of first consideration.

A. D. W.

Western Larch, Mechanical Properties of. By O. P. M. Goss (*U.S.A. Dep. Agr., Forest Service, Bull.* 122, January 27, 1913).—The Western Larch or Tamarack (*Larix occidentalis*) has been little used and the knowledge of its properties is therefore extremely limited. The results of many tests made by the Forest Service upon structural timber of the Western Larch, Douglas Fir, and Western Hemlock show the following strength ratios:—

Douglas Fir	100 per cent.
Western Hemlock	88 ,,
Western Larch	81.7 ,,

Windshake is very common in the butt section of timber of this larch—a serious defect, though the wood generally is valuable for second-class constructive purposes. There are numerous valuable tables which clearly illustrate the average strength values for different species when compared with the tree in question.—*A. D. W.*

White Flies in Florida, Natural Control of. By A. W. Morrill, Ph.D., and E. A. Back, Ph.D. (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 102; Sept. 1912; 9 plates, 1 fig.).—A report on investigations carried on in Florida for the control of white flies and cloudy-winged flies by natural means, such as fungus diseases of these insects and natural insect enemies.—*V. G. J.*

Wind and Plant Life. By Günther H. Kroll (*Beih. Bot. Cent.* xxx., Abt. 1, Heft 1, pp. 122–140).—A general essay on the various ways in which wind affects plant life directly and indirectly.—*G. F. S. E.*

Wireworms, False, of the Pacific North-West, The. By James A. Hyslop (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 95, part v.; April 1912; 6 figs.).—The Tenebrionidae, to which this genus belongs, feed on dead vegetable matter in the soil, and occasionally on dead animal tissue as well as on stored grain and other food products. Superficially the larvæ resemble the true wireworms, and on account

of this resemblance and the similarity of their depredations in the grain-field the two are often confused. On closer examination, however, the larvæ can be easily recognized; the antennæ are rather long and conspicuously clavate, the body is not flattened, and the forelegs are long and stout. These larvæ can move with much greater rapidity than the true wireworms.—*V. G. J.*

Wistarias. By P. S. Hayward (*Gard. Mag.* No. 3111, p. 436; June 14, 1913).—Besides the well-known *chinensis* and *multijuga* there are several very beautiful varieties which are little known, but which flourish equally well. Varieties of *multijuga* worth growing are *alba*, a fine white, *fragrantissima*, having a strong perfume of bean-fields, and *rosea*, a pale pink; there are also double forms of *chinensis* and *multijuga*.

Wistaria brachybotrys is a fine white with very large blossoms.

E. B.

Wood Turpentines. By L. F. Hawley (*U.S.A. Dep. Agr., Forest Service, Bull.* 105, January 11, 1913).—Turpentine differs greatly in composition and value, due mainly to the amount of refining to which it has been subjected. Here quite a number of interesting experiments have been carried out which must eventually be valuable to those who are interested in waste resinous wood as a raw material.

A. D. W.

Woods Grown in the United States, Mechanical Properties of (*U.S.A. Dep. Agr., Forest Service, Circ.* 213, March 24, 1913).—A table containing the result of tests on forty-nine species of wood—specific gravity, shrinkage, bending, and tension. These tests were carried out by the Forest Service.—*A. D. W.*

Woolly Aphis, Fighting the (*Gard. Mag.* No. 3104, p. 290; April 26, 1913).—This destructive pest is very difficult to contend with when it attacks the roots of fruit trees in addition to the stems and branches.

Success in fighting it has been attained by injecting carbon bi-sulphide into the ground in several places, 2 feet from the trunk. A similar treatment was successful in France with the Phylloxera in vineyards.—*E. B.*

Woolly Aphis Migration from Elm to Mountain Ash. By E. M. Patch (*Jour. Econ. Entom.* vol. v. pp. 395–398; fig.).—The woolly aphis (*Schizoneura lanigera*) was found abundantly on apple, *Pyrus americana*, *P. sitchensis*, and species of *Crataegus*. Root feeding was not observed, and there was no migration from root to stem in Maine. The authoress traces the aphides from elm (*Ulmus americana*) bark or elm leaves (which they cause to curl) to the apple and other plants named. She also points out that the two forms *Schizoneura lanigera* and *S. americana* cannot be separated from one another by antennal characters when a long series is examined.

F. J. C.

Wounds, Treatment of, and Cavities in Trees (*U.S.A. St. Com. Hort., Cal., Bull.* 1; 7, June 1912) describes the method of renovating large holes in trees by filling in with Portland cement after removing all dead and decaying wood. This usually preserves the tree for many years.—*V. G. J.*

Xenia. By E. M. East (*Bot. Gaz.*, Sept. 1913, pp. 217–224).—The author discusses the evidence derived from crossing experiments on Mendelian lines so far as regards the morphological nature of endosperm. The endosperm characters of maize are transmitted in a perfectly regular manner and would tend (considered apart from other facts) to show that the endosperm is sporophytic.

But they accord perfectly with Coulter's view that the formation of endosperm is an indefinite process resulting in a growth which is practically gametophytic.—*G. F. S. E.*

Yucca, Seed Production of. By Max M. Ellis (*Bot. Gaz.*, July 1913, pp. 72-78). *Yucca glauca* grows both at Boulder and Wray, Colorado. The flowers are pollinated by a single species of moth which apparently is very local. Large numbers of Yuccas flower every year and leave no seed because presumably the moth does not visit them.

The insect lays its egg in the ovary. As the larva grows, it eats its way up through the centre of the column of flat seeds which are stacked vertically in the pod like a pile of coins. The lower seeds show a hole only one millimetre or so in diameter, while the upper seeds are almost completely eaten, showing that the larva greatly increases in diameter as it develops.

On an average 280 seeds are found in a pod (maximum, 448; minimum, 168). Of these, on an average 58, or 7 per cent., are eaten by the larvæ (0 to 32 per cent.). There are 118 perfect seeds as a rule in a pod and the plant on the whole is successful.

The author discusses the advantage to the plant of the existence of various parasitic insects which lay their eggs either in the egg of the moth or in the larva. These parasites saved all the seeds in seven pods, which considerably alters the averages.—*G. F. S. E.*

Zoology, Manual of Practice in Economic. By H. A. Gossard (*U.S.A. Exp. Stn. Ohio, Bull.* 233; Nov. 1911; 11 plates).—This bulletin contains accounts and descriptions of most of the insects that attack farm, garden, and orchard crops respectively. At the end of the book are tables showing the remedies for prevention and cure and the proper times of application.—*V. G. J.*

Zygopetalum maxillare. By A. Braecklein (*Orchis*, vol. vii. pt. v. pp. 75–76).—*Zygopetalum maxillare* will grow quite as well in a mixture of Sphagnum and charcoal in pots or wooden boxes as it does on fern stems.—*S. E. W.*

ERRATA AND CORRIGENDA.

P. 7, line 32.—For *sedacea* read *setacea.*

P. 9, fig. 9.—For DIERAMA PENDULA VAR. PUMILA read DIERAMA PENDULUM var. PUMILUM.

fig. 12.—For DIERAMA PENDULA and D. PULCHERRIMA read D. PENDULUM and D. PULCHERRIMUM.

Pp. 11 and 12.—Where they occur read *Dierama pendulum, D. pendulum* var. *pumilum, D. cernuum, D. pulcherrimum.*

P. 24, line 10.—For *Lucilliae* read *Luciliae.*

P. 27.—Replace by page inserted in this number.

P. 100, line 31.—For *P. vulgaris* read *P. acaulis.*

P. 105, fig. 31.—For CLUSIANA read CLUSIANA.

P. 115, fig. 37.—For TYROLENSIS read TYROLENSIS.

P. 161, line 3.—For *simensis* read *sinensis.*

P. 165, fig. 70.—For KICHIANENSIS read KICHANENSIS.

P. 166, line 8.—For *Smithana* read *Smithiana.*

P. 178, line 31.—For SSECTION read SECTION.

P. 182, line 30.—For *cunefolia* read *cuneifolia.*

P. 190, line 4 from bottom.—For **spahulifolia** read **spathulifolia.**

P. 202, line 32.—For *Gambleiana* read *Gambeliana.*

P. 202, line 2 from bottom.—For *sinensis* read *simensis.*

P. 208, fig. 98.—For PRIMELLA read PRIMULA.

P. 223, lines 6, 7.—For Maritime and Cottian Alps read Idrian Alps.

P. 227, line 12.—For *sertum* read *sertus.*

line 14.—For præditis read praeditus.

P. 312, line 14.—For *micrcophylla* read *microphylla.*

P. 468, line 6 from bottom.—For *Cyanodon* read *Cynodon.*

P. lix, line 28.—For *Cornifolia* read *cornifolia.*

P. lxii, line 7 from bottom.—For *tibeticum* read *tibetica.*

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 8, 1913.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H., in the Chair.

Fellows elected (44).—J. S. Ardley, Mrs. R. H. Barrington, Miss F. M. Bolus, Miss G. Boxwell, H. J. Brown, Viscountess Cantelupe, C. Carpenter, D.Sc., C. A. Case, Mrs. C. Chadwick, G. Chandler, Dowager Lady Churston, H. H. Claydon, Mrs. G. P. Douglas, Miss D. F. Drummond, Mrs. H. Edmunds, George Ely, Mrs. H. E. Fletcher, Alex. Forrest, Miss V. H. Foster, Mrs. Howard Goad, Miss S. Hammersley, Mrs. H. Hardie, Mrs. Hennell, H. E. P. Hodsoll, Mrs. Irwell, Mrs. R. H. Keane, J. R. Loewe, Mrs. G. Mitchell, Mrs. Norris Oakley, W. Russell, F. A. Sanders, Mrs. F. H. Scott, J. Shemilt, Mrs. S. G. Sheppard, Miss M. J. Soper, A. A. Thompson, J. H. Usmar, F. C. Webber, Mrs. C. F. Westbury, Miss V. A. O. Wild, Alfred Williams, Mrs. F. Wright, T. S. Wyrley-Birch, Hon. Lois Yarde-Buller.

Fellows resident abroad (2).—Charles R. Beasley (Egypt), R. Kirk (China).

Associates (2).—P. Evans, C. Luxford.

GENERAL MEETING.

JANUARY 21, 1913.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H., in the Chair.

Fellows elected (63).—Mrs. L. Albu, Mrs. W. Archer, Mrs. C. J. Atkinson, Miss I. Bacon, Miss A. Baxter, Mrs. A. C. Beatson, H. Bell, G. Burch, W. H. Burch, A. G. Carver, W. Chislett, G. D. Clark, Mrs. R. Clutterbuck, Lady Dewar, L. Dunning, Miss Edwards-Moss, S. Featherstone, Mrs. H. Frodsham, F. J. Frost, Mrs. R. Gordon, C. Gordon-Lennox, Miss E. E. Gosden, Mrs. L. Gunnery, W. B. Hanson, Miss C. A. Hewitt, Mrs. T. W. Howland, Miss M. Hozier, A. W. L. Husband, Miss G. Jeyes, Mrs. I. F. Kennedy, C. R. S. Kirkpatrick, P. Kohn-Speyer, J. L. H. Lapworth, Miss E. N. Maitland, D. Marriage, R. Munro, E. J. Newman, W. Northover, Mrs. V. Oliver, Miss E. S.

Ough, Miss A. W. Playne, The Hon. Mary Spring Rice, Mrs. G. Spring Rice, Miss N. S. Robertson, J. G. Rolls, Miss M. E. L. Rosse, P. Rosenheim, Mrs. F. W. Sanderson, Miss E. Scott, Mrs. I. E. Scriven, E. Smith, J. H. T. Snook, W. Stevens, Mrs. W. Bezly Thorne, T. Wakelin, J. E. Ward, W. D. Watson, W. H. Wheeler, Mrs. G. H. Wheler, Mrs. J. Woodgate, R. V. G. Woolley, E. G. Wright, Mrs. C. H. Wright.

Associates (2).—C. B. Ellis, Miss S. M. Gibson.

Societies Affiliated (2).—Cirencester and Dist. Gard. Mut. Imp. Society; Edmonton Allotments Association.

GENERAL MEETING.

February 4, 1913.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair.

Fellows elected (89).—E. A. Adcock, E. O. Adcock, C. H. Allender, Lady Ashton, Sir John J. Baddeley, J.P., Mrs. H. R. Beattie, H. G. L. Bell, Mrs. G. Bellhouse, The Hon. Mrs. Bligh, G. R. Bonnor, J. Brampton, J. Britten, Mrs. P. Bullock, J. P. Bursnal, Mrs. W. Butler, Lady Butlin, F. W. Cave, J. D. Colledge, E. Cooling, A. P. Cunliffe, Mrs. Cyrus Daniell, W. Dettlebach, Lady Dixon-Hartland, A. R. Farrer, P. Fitter, Mrs. J. L. Fremlin, G. Furness, J. George, Mrs. A. M. Gibbes, Mrs. A. Gilbert, Mrs. G. Gold, Mrs. Golwig, Mrs. J. D. Gregory, T. P. Griffiths, A. E. Hall, Capt. A. R. Harman, E. Harris, R. L. Harrow, Mrs. A. Hayes-Sadler, R. Heinekey, Mrs. B. Hirsch, H. Hollingsworth, A. W. Holton, Mrs. G. M. Hope, A. F. Howland, G. J. Jameson, Miss M. L. Kendall, Mrs. C. Kenyon, Mrs. H. Lawrence, J. Lee-Warner, Capt. A. Le François, F. Loughton, C. M. Lushington, S. J. F. Macleod, T. Maltby, Mrs. W. J. Mappin, A. W. Mawson, F. Miller, Lady Monkswell, Mrs. Murray, Miss Nash, S. L. Odell, J. M. Orde, Mrs. C. Paget, R. Paget, R. Peterson, J. H. Podmore, Mrs. W. Rendel, Lieut.-Col. M. B. Roberts, R. V. Roger, Mrs. H. Schulman, Miss N. Sich, Mrs. T. F. Simmons, J. R. Sneyd-Kynnersley, Mrs. H. D. Stewart, Sir Dorabji J. Tata, W. H. Maxwell Telling, M.D., J. Thomas, J. D. Tremlett, Mrs. H. L. M. Tritton, R. F. L. Turner, Miss S. Warner, Mrs. Watson-Smith, Miss H. L. Wheeler, R. G. H. Williams, C. J. Wills, Mrs. G. B. Windeler, Mrs. Wood, Mrs. G. F. Yeo.

Fellows resident abroad (2).—J. Mossel (Holland), L. Palmer (Canada).

Associates (7).—T. Crosswell, Miss E. D'Ombrain, J. W. Funge, Mrs. Graeme, H. Plumley, J. P. Reid, T. A. Summerfield.

Affiliated Societies (4).—Kingsbridge, Salcombe and District Horticultural Society; Merton Horticultural Society; Stisted Horticultural Society; Uxbridge and District Horticultural Society.

A lecture on 'Plant Hunting in Bulgaria' was given by Mr. C. F. Ball (see p. 1).

ANNUAL GENERAL MEETING.

FEBRUARY 11, 1913.

Sir TREVOR LAWRENCE, BART., K.C.V.O., V.M.H., in the Chair.

Fellows elected (38).—Sir Pieter Bam, G. F. R. Barker, H. Barker, W. Bartholomew, Miss A. E. Bayly, F. G. Bell, Miss F. M. Brook, Miss E. Brooke, Miss Carwardine, P. H. Coad, Miss G. Compton, Mrs. A. DuBuisson, J. W. DuPré, Miss A. B. Gittins, Mrs. B. A. Glanvill, Mrs. W. Graham, Miss J. Guthrie, Miss Inglis, W. A. Jukes, J. Klinkert, D. Lorrimer, P. N. R. Lysaght, Miss M. S. Mackenzie, C. V. Magniac, Mrs. W. Murray, Mrs. H. Neale, S. Osborn, J.P., R. Pearson, J. B. Pinker, Miss H. G. Sewell, G. Simpson, Mrs. M. Snagge, S. Taylor, W. Thomas, Dr. Jane H. Walker, S. A. Warner, J. M. Watson, Mrs. T. A. Yarrow.

Fellows resident abroad (2).—E. S. Lord (Canada), G. L. Houghton (India).

Associate.—R. Skelhorn.

Affiliated Societies (2).—Brynmawr Horticultural Society; Roydon Cottage Garden Association.

V.M.H. Medals were handed to the Rev. W. Wilks, and the representatives of Mr. W. H. Divers and Mr. James Whitton.

The President then referred in very kind terms to the Secretary's completion of 25 years' service that day, and on behalf of the Fellows presented him with a large silver salver, being a portion of a commemorative present subscribed for by them, the remaining and major portion of which would be given to him later in the form of a cheque.* The President further announced that the Council had voted a sum of money to be devoted to the cost of painting a portrait of the Secretary.

Mr. Wilks suitably acknowledged these gifts.

The President moved the adoption of the Annual Report. This was seconded by the Treasurer and carried.

The following names of President, Vice Presidents, Members of Council and Officers having been duly proposed and seconded, and the list circulated in accordance with Bye-law 74, and no alternative names having been proposed, were declared by the President to be elected, viz.:

As President.—Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H.

As Vice-Presidents.—The Duke of Bedford, K.G., F.R.S., the Rt. Hon. Joseph Chamberlain, F.R.S., the Rt. Hon. The Earl of Ducie, F.R.S., the Rt. Hon. Lord Rothschild, Leopold de Rothschild, Esq., C.V.O., Sir John T. Dillwyn-Llewelyn, Bart., D.L., J.P., V.M.H.

As Members of Council.—Mr. J. Gurney Fowler, Mr. C. G. A. Nix, Mr. Arthur W. Sutton, V.M.H.

As Officers.—Mr. J. Gurney Fowler (*Treasurer*), the Rev. W. Wilks, M.A., V.M.H. (Secretary), Mr. Alfred C. Harper (*Auditor*).

Sir John Llewelyn proposed a vote of thanks to the President, which was seconded by Mr. Arthur Sutton, and carried with acclamation.

* See page lxxviii.

REPORT OF THE COUNCIL FOR THE YEAR 1912.

1. **International Exhibition, 1912.**—The great horticultural event of the year was undoubtedly the Royal International Horticultural Exhibition held at Chelsea on May 22 to 30. The Exhibition owed its inception to our Society, but it was for many reasons thought better that the Society should act as a benevolent god-parent than as the responsible promoter of the Exhibition, which was accordingly organized by a small Public Company, of which His Grace the Duke of Portland, K.G., was the President, Mr. J. Gurney Fowler the Chairman, Sir Jeremiah Colman, Bart., the Treasurer, and Mr. Edward White the Managing Director, the Society standing, as it were, behind them with its subscription of £1000 and its guarantee of £4000. The Council are glad to have been informed that owing to the magnificence of the Exhibition itself, coupled with the exceptionally fine weather all through its continuance, none of the guarantee money will be required, but, on the contrary, a substantial credit balance remains.

No words can describe the beauty and excellence of the Exhibition, which reflected the utmost credit on all the exhibitors, both British and Foreign, whom the Society's officers did all in their power to assist.

In addition to the splendid hospitality extended in more immediate connexion with the Exhibition itself, such as the Dinner given by Mr. Leopold de Rothschild at Gunnersbury and the Reception held by His Grace the Duke of Portland and the Garden-party at Sir Frank Crisp's, Sir Trevor Lawrence, Bart., our President, gave a charming al fresco Luncheon and Reception to the Foreign visitors and others at his beautiful country house and garden at Burford, and the Council held a Banquet in the Society's Hall, to which over eight hundred guests were invited. A Report of this will be found at page xcvi of the JOURNAL, vol. xxxviii. part 2.

2. **Honour to Horticulture.**—Following on the mention of the International Exhibition, the Council cannot omit to record the honour done to Horticulture by His Majesty the King in bestowing a Knighthood on Sir Harry Veitch. They are sure that all Fellows of the Society will rejoice in the distinction thus bestowed upon one of the most active and useful members of the Council. Wherever gardens are valued Sir Harry Veitch's name has long stood in the front rank of those whom we honour and esteem. His energy, enterprise, and success in every branch of horticulture have been most marked, especially in the introduction of valuable new trees, shrubs, and plants for the embellishment of our woods and gardens.

3. **Wisley Rock Garden and Alpine House.**—The planting of the Rock Garden is proceeding as rapidly as possible, having regard to the desirability of the plants used. It is exceedingly easy to cover a rock garden in a few months with what may be called, more or less, "floral weeds," but such plants will, in twelve months, smother their smaller, slower-growing, and more valuable brethren, so that to obtain a well-planted rock garden it is of all things necessary to have patience, and hasten slowly.

During the past year an Alpine Plant House has been erected above the Rock Garden, chiefly for the purpose of growing those rock plants to perfection which blossom too early to withstand our wet winters and spring frosts. In this house Fellows will be able to see such plants in flower from February onwards.

4. **Grapes at Wisley.**—The policy of the Council has been to pay attention chiefly to varieties of grapes which are both of good flavour and are less known than those usually grown, quite irrespective of the natural size of the berry, considering that a small berry of high flavour is superior to a large one with little or none. With a view of drawing public attention to these highly flavoured though smaller-berried varieties, collections of them have been shown on several occasions at Vincent Square, and in 1911 a collection was sent to the Great Show of the Royal Caledonian Society at Edinburgh, and a similar collection was exhibited at Shrewsbury, in 1912, where they attracted widespread attention and were awarded a special Gold medal.

5. **Nomenclature of Cape Pelargoniums.**—The work of naming and collating the many synonyms of the Cape or Scented-leaved Pelargoniums sent to Wisley for that purpose has been carefully pursued, the task having been entrusted to Mr. John Fraser, F.L.S., of Kew. The list will appear as soon as possible in the JOURNAL, but it will be necessary to continue the work in 1913, and those having collections are requested to send cuttings to Wisley in February, if they have not already done so, that they may be grown for comparison of both plant and name with those already examined, and their true names established.

6. **Trials of Sundries.**—During the past year a scheme for the Trial of Horticultural Sundries has been initiated. The Trials will be conducted at Wisley, and the articles sent adjudicated upon by a special Committee, who will recommend suitable awards to the Council. These awards will be bestowed at the Chelsea or Holland House Shows following the conclusion of the Trial. The award cards can then be displayed by the exhibitors with the articles referred to. These special awards will remain good for ten years, after which time the exhibitor will contract with the Council to cease advertising the award, unless it shall have been subsequently granted for another period of ten years. The ten years period has been established in

view of the possibility of still better goods or inventions than those which first won an award coming under the Society's notice.

7. **The Library.**—Ever since the Lindley Library came under the direct management and control of the Society in 1910 the Council have consistently pursued the policy of securing, as far as possible, any really good and desirable books on horticulture which might happen to come into the market, and in the past year about £800 has in this way been expended on books and nearly £70 on binding. Among the rarer and more valuable books thus acquired may be mentioned Gallesio's "Pomona Italiana," Reichenbach's "Icones Floræ Germanicæ," Jacquin's "Floræ Austriacæ" and "Plantarum rariorum Horti Cæsarei Schoenbrunnensis," Andrew's "Roses," "The Grete Herball," Hooker's "Pomona Londinensis," Wildenow's "Hortus Berolinensis," Prevost's "Collection des Fleurs et des Fruits," Laguna's "Flora Forestal Española," Curtis's "Camellias," and an exceedingly beautiful collection of old Chinese paintings of flowers.

8. **Douglas' Journal.**—In the early part of the year an application was received from the Department of Agriculture of the United States Government, requesting the loan of the Journals kept by Robert Douglas of his travels on behalf of the Society through North America in 1824 and the following years, together with permission to publish them if the Department thought fit. Whilst greatly desiring to comply with the request of the U.S.A. Government, which has done so much for horticulture all the world over, the Council hesitated to risk the consignment of the manuscript to such a distance, especially as it has always ranked with those rare and valuable books which are never allowed to be taken out of the Library. It was therefore thought better that the Society should itself publish this valuable and interesting Journal. The Secretary was accordingly requested to undertake the task of editing it and preparing it for the press. The work is unavoidably a long one as the writing is often very indistinct, and has faded in places, and it has also been found necessary to refer the identification and nomenclature of villages, rivers, &c., to the U.S.A. Department of Agriculture, but it is hoped that it may be ready for the press during the coming year.

9. **The Great May Show.**—There is hardly a Fellow of the Society who has not experienced the inconvenience of the overcrowding at the Temple. The Society has received much kindness from the Master and Benchers in being allowed for so long a time to make use of their gardens, but for several years past the feeling of attachment to the Temple Garden and dislike of the crowding have been struggling together for the mastery; and now that the International Exhibition has proved that people will go to Chelsea as readily as to the Temple, the Council have unavoidably come to the conclusion that it is their bounden duty in the interest of the vast majority of the Fellows

to move the Show in future to Chelsea, which affords a site nearly three times as large as the Temple. The Great May Show will accordingly be held on May 20, 21, and 22, 1913, on the same site as, and in a tent similar to that of, last year's International, and the Council hope that Fellows will individually invite and encourage their friends to attend.

10. **Money Deposit with Entry.**—On several occasions great inconvenience has been experienced, especially at the Great May and July Shows, owing to exhibitors applying for and obtaining an allotment of space, and at the last moment failing to utilize it, thus causing not only unsightly gaps in the staging, but making exhibitors, who have not obtained all the space they desired, think that they have been unduly and unnecessarily curtailed. In order to check this asking for space which they cannot properly fill, all exhibitors at the two great Shows at Chelsea and Holland House will in future have to deposit £1 with their application for each space, which deposit will be returned in full if the space allotted is filled to the satisfaction of the Council, but will be forfeited absolutely if the space is not filled, or if in the opinion of the Council the space is not adequately filled.

11. **Exhibits of Horticultural Sundries.**—Owing to the lack of space it has hitherto been impossible to accept exhibits of Horticultural Sundries at the Spring Show. Abundant accommodation is, however, provided in close proximity to the floral exhibits in the arrangement of the show ground at Chelsea, which Sundriesmen will doubtless be glad to occupy. Plans of positions, &c., are now ready for issue.

12. **Holland House Show.**—The 1912 Show at Holland House was a considerable advance on previous years as regards both the quantity and quality of the exhibits, and their arrangement in the new well-ventilated tents supplied by Messrs. Piggott. It was unfortunate that the rainy weather reduced the attendance and gate money to such an extent that £655 was lost on the Show. The 1913 Holland House Show will be held on July 1, 2, and 3, when better financial results are hoped for. Fellows are particularly asked to do their utmost to make this Show known amongst their friends by inviting their attendance, as it would be a great pity if such a fine annual exhibition continued to show a financial loss. Fellows ought surely to feel a pride and personal responsibility in assisting to maintain the Society's Shows.

13. **Orchid Show and Conference.**—Ten years ago it would have been thought impossible to produce a Show of Orchids at the beginning of the month of November. Certainly no one would have dreamt of such a glorious display as was to be seen at the Hall on

the 9th of that month. The Hall was nearly filled with magnificent exhibits, which not only spoke of wonderful cultural skill, but also strongly emphasized the excellent work done by hybridists in bringing about such an extended season of flowering, and the debt of gratitude due to them from all lovers of flowers.

On the second day of the Show a Conference was held, under the Chairmanship of Mr. J. Gurney Fowler, when the following papers, which will appear in due course in the JOURNAL, were read, viz. :—

(1) "The Physiology of Fertilization," by Professor F. Keeble, M.A., Sc.D.; (2) "The Application of Genetics to Orchid Breeding," by Major C. C. Hurst; (3) "Some Epiphytic Orchids," by Mr. H. G. Alexander; (4) "Albinism in Orchids," by Mr. R. G. Thwaites.

14. **Primula Conference.**—A Primula Conference has been arranged for April 16, 1913, when Sir John Llewelyn, Bart., will occupy the Chair. The papers to be read are as follows :—

"Himalayan Primulas," by Mr. Craib, of Kew.
"European Hybrids in Nature," by Mr. Reginald Farrar.
"Primulas from a Garden Point of View," by Miss Jekyll.
"Chinese Species of Primula," by Professor Bayley Balfour, F.R.S.
"European Primulas," by Dr. John MacWatt.

15. **Deputations.**—In response to an invitation a Deputation from the Council, consisting of Messrs. J. Gurney Fowler, H. B. May, V.M.H., and C. G. A. Nix, attended the Summer Show of the Leamington Society on July 24, and made awards, when they were cordially received and entertained by Alderman and Mrs. Holt. Also on September 3 a similar Deputation, consisting of Sir Daniel Morris, K.C.M.G., M.A., D.Sc., D.C.L., F.L.S., V.M.H., Sir Harry Veitch, V.M.H., and Messrs. H. B. May, V.M.H., and J. Hudson, V.M.H., visited the Centenary Show of the Glasgow and West of Scotland Society, when an excellent programme of entertainment was provided for them, including a visit to the lovely residence of Mr. and Mrs. W. J. Chrystal on Loch Lomond, luncheon with the Lord Provost and Parks Committee of Glasgow, and a tour of the public parks and gardens belonging to the City.

Invitations have been received and accepted for Deputations to be sent to the Birmingham Society's Show on July 18, the Cardiff Show on July 23, and the Northern Fruit Congress at Kendal in October 1913.

16. **Special Shows in 1913.**—The following special Exhibitions are arranged for the year 1913, viz., the Forced Bulb Show on March 4 and 5, a Daffodil Show on April 15 and 16, a Tulip Show on Wednesday, May 14, a Rhododendron Show from May 27 to 30, a Vegetable Show on September 23, and the Show of British-grown Fruits on September 25 and 26. The Fruit Show occurs a fortnight earlier than usual in order that soft fruits and the earlier ripening apples and pears may be seen to greater advantage.

The notice of Fellows is specially drawn to the fact that in order to avoid the Tuesday in Whitsun week the fortnightly show in May will be held on Wednesday, May 14, instead of, as usual, on a Tuesday.

17. **R.H.S. Cups, 1913.**—The Council have decided in future to adopt one special and distinctive form of cup for each year, and to have it made in four different sizes. The pattern adopted for 1913 will be found illustrated in the Book of Arrangements. The four different sizes will be known as follows:—

1. The R.H.S. Silver-gilt Cup.
2. The R.H.S. Large Silver Cup.
3. The R.H.S. Silver Cup.
4. The R.H.S. Standard Cup—so called because its design standardizes the pattern for the year.

With regard to Challenge Cups and Special Cups for 1913, Fellows are referred to the Book of Arrangements.

18. **Diploma in Horticulture.**—The Committee appointed to consider the desirability of establishing a Diploma in Horticulture have held several meetings during the year, and have consulted a large body of persons whose opinion was considered of value, and have reported that it is desirable to establish such a Diploma.

The Council, therefore, at once approached the President of the Board of Agriculture and Horticulture, the Rt. Hon. Walter Runciman, M.P., who most kindly met the Committee, and after hearing their views, promised, after due time for consideration, to communicate with the Council on the subject. The promised communication was promptly sent—it empowers the Society to establish an examination, conducted by a joint Committee of Members appointed by the Board and the Society, to determine the recipients of the Diploma, which will bear the words "National Diploma in Horticulture, awarded by the Royal Horticultural Society, under a Scheme approved by the Board of Agriculture." The Society has consented to bear the expense (over and above the amount received for fees) attaching to this long-needed proof of ability in the art of gardening.

It is hoped that a Degree in Horticulture may also be established by the University of London, and it will in that case be the aim of the Council to make the Society's Diploma work up towards the University Degree.

19. **Examinations.**—The Examinations of the Society are assuming greater importance every year. In 1912 a total of 1486 Candidates sat, as against 835 in 1911.

20. **Garden Inspector.**—The number of applications from Fellows for an Inspector to visit, advise, and report on their gardens, has increased to such an extent of late years, that it was felt to be time

that a separate officer should be appointed for this particular branch, and that the Superintendent at Wisley should not be so frequently called away from his own legitimate work. The Council have been fortunate in coming to an arrangement with Mr. C. R. Fielder, V.M.H., who is eminently qualified for the post, having been for many years head of the well-known and excellent gardens at North Mymms, and more recently appointed Head Gardener to Miss Willmott, V.M.H., at the world-renowned gardens at Warley Place.

21. **Parliamentary Committee.**—A feeling has been steadily growing amongst horticulturists that their interests require more careful watching with regard to Parliamentary and Departmental action than is possible for the Council, which is so fully occupied with the Society's more immediate business. It has therefore been decided to establish a Parliamentary Committee whose work it shall be to advise the Council of the Society of opportunities—

1. For using the great influence of the Society, either in initiating legislation in favour of horticulture, or for influencing measures in any way affecting horticulture, which may at any time be introduced into Parliament; and
2. For informing the Department of Agriculture and Horticulture of the views, and wishes, and wants of horticulturists; and
3. For co-operating with the Department in any useful and desirable movements.

22. **Congress of Entomology.**—Sir Daniel Morris, K.C.M.G., M.A., D.Sc., D.C.L., F.L.S., V.M.H., represented the Society at the International Congress of Entomology at Oxford in August. An extract from his report will be found at page 345 of the JOURNAL, vol. xxxviii., part 2.

23. **Royal Society Celebrations.**—The President, Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., represented the Society at the 250th anniversary celebrations of the Royal Society in July last.

24. **New Corresponding Fellows.**—The following have been appointed Honorary and Corresponding Fellows of the Society, viz., H.M. King Ferdinand of Bulgaria, a great flower lover and botanist; Monsieur G. Gibault, Librarian to the Société Nationale d'Horticulture de France; Dr. Bertram Post, of Robert College, Constantinople; and Professor A. E. Day, of the Syrian Protestant College, Beirut, Syria.

25. **Retirement of Members of Council.**—The Council have learnt with extreme regret—a feeling which will be fully shared by all the active workers of the Society—that Mr. W. Marshall, V.M.H., acting under medical advice, is compelled to relinquish his seat on the Council and his Chairmanship of the Floral Committee. Mr. Marshall has for more years than most can remember served the Society most whole-heartedly, not only by his constant presence at the meetings of the Council to which he was first elected in 1868, but also by his

kindly, genial, and yet firm guidance of the Committee over which he has presided for a long course of years. The Council have created a new office, that of Honorary Chairman of the Floral Committee, in order to keep still in touch with a name so long identified with the best traditions of the Floral Committee's work.

The Council also desire to express their sense of the constant willingness to assist them at all times, to the utmost extent of his power, shown by the Hon. John Boscawen, as well as for promoting the interests of the Society in Cornwall, and they greatly regret that distance from London makes him unable to continue to attend the meetings of the Council with the necessary regularity.

26. **V.M.H. List.**—It is with great regret that we have to record the death of three holders of the Victoria Medal of Honour, viz., the Rev. F. D. Horner, of Burton in Lonsdale—the great authority on Auriculas and Tulips; Mr. R. Fenn, of Sulhampstead—the early hybridizer of Potatos; and Mr. Alexander Dean, the Vegetable specialist, of Kingston-on-Thames. Mr. Dean's long and active career in horticulture, and his constant work for the Society and regular presence at its meetings, renders his loss widely felt.

To fill the three vacancies, the Council have bestowed this distinction upon Mr. Divers, of Belvoir Castle Gardens; Mr. Whytton, of Glasgow City Parks; and the Rev. W. Wilks, for 25 years Secretary of the Society. At the beginning of the year the Council bestowed the V.M.H. upon Lt.-Col. Sir David Prain, C.M.G., C.I.E., F.R.S., of Kew, and Mr. E. H. Wilson, the celebrated plant collector, to succeed Sir Joseph Hooker, F.R.S., and Mr. James Douglas, the Carnation specialist, whose deaths are recorded in last year's annual report.

27. **Pocket Diary.**—The R.H.S. Gardeners' Pocket Diary has met with a far greater sale than was ever anticipated for its first year of publication, and many have been the letters received testifying in the kindest terms to its usefulness as a pocket companion for Gardeners, both Amateur and Professional. It is hoped that the issue for 1913 will be found to be an improvement on that of last year and may meet with an equally wide circulation.

28. **Affiliated Societies Certificate Cards.**—At the request of several of the Affiliated Societies, the Council have had the Certificate Card (issued some years ago for the use of Affiliated Societies) beautifully coloured, and it will be available in March. The uncoloured Card will still continue to be issued at the old prices, and the new coloured Card at 8*d.* a single copy or 10 for 5*s.* post free.

29. **Obituary.**—The Council regret, amongst others, to have to record the death of the Dowager Duchess of Sutherland, the Right Hon. Lord Llangattock, a constant exhibitor at the Society's meetings, Lieut.-Gen. Lord Calthorpe, K.C.B., Viscount Peel, the Hon. William Lowther, The Hon. John Ashburnham, Lady Saville, Lady Hamilton, Lady Brownlow, Sir Charles Whitehead, Sir Robert Pullar,

J.P., Major J. J. Joicey, Willie James, Esq., C.V.O., M. Théophile Durand, Director of the Belgian State Botanic Gardens, Eduard Strasburger, the eminent German botanist, and Messrs. A. Domeier, the celebrated botanist, H. J. Adams, J. S. Bergheim, W. Fyfe, C. P. Kinnell, and Hayward Mathias.

30. **Annual Progress.**—The following table will show the Society's progress in regard to numerical strength during the past year :—

Loss by Death in 1912.

		£	s.	d.
Hon. Fellows	6	0	0	0
Life ,,	11	0	0	0
4 Guineas	4	16	16	0
2 ,,	82	172	4	0
1 Guinea	88	92	8	0
	191	£281	8	0

Loss by Resignation, &c.

		£	s.	d.
4 Guineas	1	4	4	0
2 ,,	216	453	12	0
1 Guinea	410	430	10	0
Associates	32	16	16	0
Affiliated Societies	23	24	3	0
	682	£929	5	0
Total Loss	873	£1,210	13	0

Fellows Elected in 1912.

		£	s.	d.
Hon. Fellows	7	0	0	0
4 Guineas	7	29	8	0
2 ,,	605	1,270	10	0
1 Guinea	718	753	18	0
Associates	50	26	5	0
Affiliated Societies	18	18	18	0
Commutations = £312 18s. 0d.	14			
	1,419	£2,098	19	0
Deduct Loss		1,210	13	0
Net Increase in Income		£888	6	0

New Fellows, &c.	1,419
Deaths and Resignations	873
Numerical Increase	546
Total on December 31, 1911	12,839
Total on December 31, 1912	13,385

31. **Committees, &c.**—The Society owes a constantly recurring debt to the members of the Standing and Special Committees, Chairmen, Judges, Writers of Papers for the Journal, Compilers of Extracts, Reviewers, Lecturers, and the several Examiners, who during the past twelve months have done so much to contribute to the Society's usefulness, and to help maintain its high standing among the practical and scientific institutions of the world.

The Council also acknowledge their obligations to the Press for their invaluable assistance in reporting upon, and calling attention to, the work of the Society.

By Order of the Council,

W. WILKS,

Secretary.

Royal Horticultural Society,
Vincent Square, Westminster, S.W.
January 1, 1913.

Addendum by the President :—

32. **The Society and its Secretary.**—When this Report is laid before the Annual Meeting on February 11, 1913, exactly twenty-five years will have passed away since the troublous times of 1888, when the Society was reorganized, and left South Kensington.

It will be within the memory of some of the Fellows that after the death of our illustrious President, the Prince Consort, the Society

began gradually to drift away from the object of its first constitution and into debt. The burden of this cannot be laid on the shoulders of any one man, nor indeed of any Committee or Council, for the Society has ever been served by most devoted men; it was rather the natural outcome of circumstances the result of which it was impossible to foresee, and though the Council and Officers wrestled long and bravely with adverse conditions, it became evident in 1887-8 that a radical alteration must be made.

All through 1887 plans for reformation and renovation were discussed, and in February 1888 a new Council was appointed, with Sir Trevor Lawrence, Bart., K.C.V.O., as President, Sir Daniel Morris, K.C.M.G., Treasurer, and the Rev. W. Wilks, M.A., Secretary.

Ever since that time the President and Secretary have remained unchanged. Sir Daniel Morris (who did such admirable work for the Society's finances until 1891, when he was appointed by Mr. Chamberlain, then Secretary of State for the Colonies, to the important post of Imperial Commissioner of Agriculture in the West Indies) was succeeded by Mr. Philip Crowley, at whose death, in 1899, the increasing burden of the Treasurer's office was taken up by Mr. Gurney Fowler, to whom the Society owes much for his skilful conduct of the finances during the difficult years whilst building operations were in progress, and in more recent years with their increased financial obligations.

In 1888, as mentioned above, the appointment of the Rev. W. Wilks, then Vicar of Shirley, Croydon, as Honorary Secretary took place. It would be a grave omission were the selection then made passed over without record or remark. For it has proved a most fortunate appointment in the interests of the Society, and of the Horticulture of the Kingdom. The new Hon. Secretary was known as a keen gardener, with a wide knowledge of many branches of horticulture. But it can scarcely have been anticipated that he would develop into the ideal Secretary he has proved to be during the long period he has served the Society, now a full quarter of a century. During all these years he has shown a whole-hearted devotion to the best interests of the Society. This has been coupled with an unflagging energy and zeal, a discretion, tact, and judgment rarely at fault, and by an unfailing courtesy, which have endeared him to the Fellows to a degree seldom met with. For years Mr. Wilks was not only the Society's unpaid Secretary, but also the unremunerated Editor of its JOURNAL, which he has been largely instrumental in raising to the position it now occupies. Later on, with the greatly increased burden of the work of the Society, it became necessary to add a remuneration to the office of Secretary of the Society. But whether honorary or remunerated, it is scarcely necessary to add that Mr. Wilks enjoys, and always has enjoyed, the full confidence of the Council, and they believe of the Fellows generally.

TREVOR LAWRENCE, *President.*

Dr. **ANNUAL REVENUE & EXPENDITURE ACCOUNT**

	£	s.	d.	£	s.	d.
To Establishment Expenses—						
Ground Rent	690	0	0			
Rates and Taxes	468	10	2			
Water Rate	77	18	5			
Electric Light	244	6	11			
Gas	37	0	7			
				1,517	16	1
Salaries and Wages	1,951	9	10			
Printing and Stationery	1,146	8	4			
Postages	521	12	1			
Fuel	78	13	0			
Professional Fees	112	9	6			
Gratuities	70	0	0			
Repairs and Renewals (including £150 for Hall Painting)	373	14	8			
Miscellaneous Expenses	188	18	5			
				4,443	5	10
„ Insurances to 31st December, 1912				19	16	2
„ Journal, Printing and Postage				3,038	10	6
„ Wisley Scholarship. Given by the Society				25	0	0
„ Staff Pension	549	5	1			
Less contributed by the Staff, as per scheme	222	14	0			
				326	11	1
„ Shows and Meetings—						
Holland Park Show	1,406	14	3			
Autumn Fruit Show	360	10	6			
Labour, Floral Meetings and Conferences	220	4	5			
Expenses, do do	38	9	6			
Council, Committee & Deputation Expenses	268	18	4			
Painting Orchid Certificates	50	5	0			
				2,345	2	0
„ Prizes and Medals—						
Awarded at Society's Shows	577	9	5			
Do. by Deputation at other Shows	74	5	10			
				651	15	3
„ Wisley Gardens—						
Salaries	536	13	0			
Rates and Taxes	85	0	4			
Labour	966	9	0			
Garden Implements	98	17	9			
Loam and Manure	78	5	1			
Repairs	111	11	1			
Fuel	233	12	0			
Miscellaneous Expenses	150	7	3			
Trees and Shrubs	62	0	3			
Rock Garden Plants	22	1	0			
				2,344	16	9
„ Cost of Growing, Packing and Distribution of Plants to Fellows				299	2	0
„ Laboratory, Wisley—						
Salaries	455	0	0			
Miscellaneous Expenses	116	8	1			
Prize Fund	5	12	0			
				577	0	1
„ Contribution to Lindley Library (Purchase of Books)	783	6	2			
„ Contribution to Lindley Library	126	13	10			
				910	0	0
„ Special Expenditure—						
Banquet in connexion with International Horticultural Exhibition	780	2	11			
Iron Gates. Goods Entrance to Hall	25	0	0			
Cost of New Fencing. Wisley	86	19	0			
				892	1	11
„ Depreciation—						
Hall Glass Roof, Furniture, Glass Houses, Wisley, Plant and Materials				616	15	6
				18,007	13	2
„ Balance, carried to Balance Sheet				9,194	4	1
				£27,201	17	3

FOR YEAR ENDING 31st DECEMBER, 1912.

Cr.

	£ s. d.	£ s. d.
By Annual Subscriptions		19,003 2 0
„ Entrance Fees		330 15 0
„ Dividends and Interest	2,499 7 4	
„ Do. do. Davis Trust	50 11 2	
		2,549 18 6
„ Shows and Meetings—		
Holland Park Show	666 13 3	
Autumn Fruit Show	12 13 0	
Takings at Hall Shows	281 17 2	
		961 3 5
„ Journals and other Publications—		
Advertisements	706 5 10	
Sale of Publications	209 15 8	
		916 1 6
„ Hall Lettings	2,923 7 4	
Less Labour Expenses	253 12 9	
		2,669 14 7
„ Prizes and Medals		216 10 3
„ Examinations in Horticulture—		
Amount received in Fees	347 0 0	
Less expended	194 11 11	
		152 8 1
„ Inspection of Gardens—		
Amount received in Fees	153 14 6	
Less expended	134 11 2	
		19 3 4
„ Wisley Gardens—		
Produce sold	89 10 7	
Students' Fees	73 10 0	
		163 0 7
„ Educational Grant, Wisley School		200 0 0
„ Legacy		20 0 0
		£27,201 17 3

Dr.

BALANCE SHEET

	£ s. d.	£ s. d.
To Capital Funds Account—		
As at 31st December, 1911	£36,000 14 4	
Life Compositions received since	312 18 0	
		36,313 12 4
„ Sundry Creditors		381 5 0
„ Subscriptions, &c., paid in advance		553 10 6
„ Wisley Scholarships—		
Balance 31st December, 1911 £18 15 0		
Given by the Society, 1912 25 0 0		
	43 15 0	
Less paid to Scholars	37 10 0	
		6 5 0
„ Reserve Account—Hall Painting—		
Balance 31st December, 1911	73 13 4	
Added 1912	150 0 0	
		223 13 4
„ Depreciation and Renewals Reserve Account—		
As at 31st December, 1911	3,047 18 0	
Added 1912	616 15 6	
		3,664 13 6
„ Williams Memorial Fund		36 2 5
„ Masters Memorial Fund		7 7 3
„ Nicholson Memorial Fund		33 12 6
„ Lawrence Testimonial Fund		127 0 5
„ Schröder Pension		9 8 4
„ Lindley Library Trust		7 7 11
„ General Revenue Account—		
Balance, 31st December, 1911	72,207 4 1	
Less Bad Debts	1 10 0	
	72,205 14 1	
„ Revenue for the Year, as per annexed Account	9,194 4 1	
		81,399 18 2
		£122,703 10 8

31st DECEMBER, 1912. Cr.

	£ s. d.	£ s. d.
By CAPITAL EXPENDITURE—		
„ NEW HALL AND OFFICES—		
As at 31st December, 1911		40,950 11 2
„ FURNISHING HALL AND OFFICES—		
As at 31st December, 1911	2,182 2 5	
Expenditure since (Epidiascope and Cabinet)	150 6 9	
		2,332 9 2
„ WISLEY GARDENS :—		
Dwelling Houses—		
As at 31st December, 1911 . £5,556 6 10		
Expenditure since . . 23 5 0		
	5,579 11 10	
Glass Houses, Ranges, Potting Shed, &c.—		
As at 31st December, 1911 . 4,560 14 6		
Expenditure since . . 119 10 0		
	4,680 4 6	
Laboratory—		
As at 31st December, 1911	1,627 14 11	
		11,887 11 3
N.B.—The Wisley Estates are, under the Trust Deed, vested in the Society only so long as it is in the position to use them as an Experimental Garden. The value of the expenditure thereon depends therefore on the continual use of the Garden by the Society.		
„ PLANT AND MATERIALS—		
Appliances for Shows—		
As at 31st December, 1911 . £236 11 0		
Expenditure since (Tent) . . 60 0 0		
	296 11 0	
Horses & Carts, Garden Plant, &c., Wisley .	89 4 11	
Furniture and Fittings, Wisley . . .	180 1 3	
Fencing and Wire Netting, Wisley . .	102 6 9	
Scientific Instruments and Fittings, Laboratory	205 6 5	
Breakable Apparatus, Laboratory . .	95 2 4	
		968 12 8
„ SUNDRY DEBTORS AND PAYMENTS MADE IN ADVANCE		1,474 2 9
„ INVESTMENT of DEPRECIATION and RENEWAL and RESERVE ACCOUNT—		
3½% India Stock £3,152 6 2 . . *cost*		3,047 18 0
(*The approximate value of this Investment on the 1st January*, 1913, *is* £2,868 12*s.*)		
„ INVESTMENTS, as per Schedule		61,329 10 9
(*The approximate value of these Investments on the 1st January*, 1913, *is* £57,164 14*s.* 11*d.*)		
„ CASH—		
At Bank	716 3 9	
In Hand	56 17 2	
		773 0 11
		£122,763 16 8

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on the 31st Dec., 1912.

ALFRED C. HARPER, *Auditor*
(HARPER BROTHERS & FEATHER, *Chartered Accountants*),
35 Great Tower Street, London, E.C.

9th January, 1913.

Dr.

ALFRED DAVIS

Bequeathed to the Society in 1870 for Annual Prizes,

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1911 . .	1,797 8 9	
„ Dividends Received, 1912		50 11 2

WILLIAMS

Raised by Donations in 1891 in Memory of

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1911 . .	168 0 0	
„ Balance 31st December, 1911		29 10 11
„ Dividends Received, 1912		6 11 6
		36 2 5

MASTERS

Raised by Donations in 1908 in Memory of Dr. Masters

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1911 . .	290 13 6	
„ Balance 31st December, 1911		7 7 3
„ Dividends Received, 1912		10 0 0
		17 7 3

NICHOLSON

Raised by Donations in 1908 in Memory of

	£ s. d.
To Amount of Fund 31st December, 1911 . .	33 12 6

LAWRENCE

	£ s. d.
To Amount of Fund, 31st December, 1911 . .	127 0 5

SCHRÖDER

Provided by Royal Horticultural Society in Memory of the late Baron

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1911 . .	557 14 6	
„ Balance 31st December, 1911		9 8 4
„ Dividends Received, 1912		20 0 0
		29 8 4

LINDLEY LIBRARY

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1911 . .	4,338 9 2	
„ Contribution from R. H. Society, 31st December, 1912	783 6 2	
	5,121 15 4	
To Dividends and Donations Received, 31st December, 1912		46 10 6
„ Contribution from R. H. Society, 31st December, 1912		126 13 10
		173 4 4

TRUST FUND.

or in any other way the Council may determine.

		£ s. d.	£ s. d.
By Consols, £2,022 8s. 9d.	*cost*	1,797 8 9	
„ Revenue and Expenditure Account . . .			50 11 2

MEMORIAL FUND.

B. S. Williams towards Prizes and Medals.

	£ s. d.	£ s. d.
By East India Railway Annuity Class B £7 . .	168 0 0	
„ Balance in hands of R. H. Society . . .		36 2 5
		36 2 5

MEMORIAL FUND.

towards the Provision of one or more Annual Lectures.

	£ s. d.	£ s. d.
By Midland Railway Preference Stock £400 . .	290 13 6	
„ Prof. Bayley Balfour for Lectures, 1912 . .		10 0 0
„ Balance in hands of R. H. Society . . .		7 7 3
		17 7 3

MEMORIAL FUND.

George Nicholson for Prizes to Wisley Students.

	£ s. d.
By Balance in hands of R. H. Society . . .	33 12 6

TESTIMONIAL FUND.

	£ s. d.
By Funds in hands of R. H. Society . . .	127 0 5

PENSION.

Schröder to pay to Gardeners' Royal Benevolent Institution for one Pension.

	£ s. d.	£ s. d.
By Great Western Railway 4 per cent. Debenture Stock £500	557 14 6	
„ Gardeners' Royal Benevolent Institution . .		20 0 0
„ Balance in hands of R. H. Society . . .		9 8 4
		29 8 4

TRUST.

	£ s. d.	£ s. d.
By Lancashire and Yorkshire Railway 3 per cent. Preference Stock £1,458 15s. 7d. held by the Charity Commissioners	1,516 0 0	
„ Value of Library, 31st December, 1911 . .	2,822 9 2	
„ Purchase of Books, 1912 (*See* Report) . .	783 6 2	
	5,121 15 4	
By Binding Books and Stationery, 31st December, 1912		65 16 5
„ Librarian's Salary		100 0 0
„ Balance in hands of R. H. Society . . .		7 7 11
		173 4 4

SCHEDULE OF INVESTMENTS.

31st December, 1912.

		£	s.	d.
2½ % Consols, £8,554 5s. 2d.	*cost*	8,162	16	0
3 % Local Loans, £5,800	,,	6,006	16	6
3½ % Indian Rupee Paper, 37,000 Rupees	,,	2,462	14	4
3½ % Dominion of Canada Registered Stock £2,000	,,	2,000	0	0
4 % Canadian Pacific Railway Co. Consolidated Debenture Stock, £4,632	,,	4,999	14	1
3½ % London County Consolidated Stock, £3,000	,,	3,020	13	6
4 % Great Eastern Rly. Debenture Stock £3,500	,,	3,969	17	3
3½ % India Stock £2,063 4s. 6d.	,,	2,024	10	4
4 % Northern Pacific and Great Northern Railway Joint Bonds £5,000	,,	5,056	6	0
4 % New York Central and Hudson River Railroad Co. Gold Debentures £6,000	,,	5,857	6	9
4 % Chicago, Milwaukee & St. Paul Railway Co. 25 years, Gold Bonds £2,000	,,	1,930	4	0
4½ % Central Argentine Railway Preference Stock £2,800	,,	2,907	3	6
5 % Buenos Ayres Great Southern Railway Preference Stock £2,500	,,	2,985	8	6
5 % Havana Terminal Mortgage Debenture Bonds £8,300	,,	8,946	0	0
4 % Mortgage on Freehold	,,	1,000	0	0
		£61,329	10	9

GENERAL MEETING.

February 18, 1913.

Dr. A. B. Rendle, F.R.S., F.L.S., in the Chair.

Fellows elected (54).—Miss J. S. Anderson, J. Bailey, Mrs. H. M. Baily, E. G. Barnett, G. B. Bird, D. C. Bolton, Mrs. H. Campbell, F. C. Canham, Mr. Casstine, Hon. Mrs. W. Cavendish, Mrs. E. Cawthra, Miss M. Chaplin, Dr. Fielding Clarke, J. Clay, Mrs. M. G. Cochran, E. H. Coleman, O. E. Coles, Mrs. W. A. Colls, Lady Katherine Drummond, Dr. R. A. Dunn, T. A. Emeny, Mrs. P. Fletcher, R. Morgan Grenville, Mrs. S. Hancock, Mrs. A. F. Home, Miss Hoyte, R. M. F. Huddart, Mrs. D. Keith, J. Kennan, Miss A. Lindsay, Miss E. V. Lulham, M. Mort, F. Munns, Mrs. H. Nelson, Lady Newnes, A. Niblett, L. P. Purton, R. J. G. Read, P. Schiller, A. J. Sewell, C. F. Slater, H. A. Smith, Mrs. F. E. Smith, Mrs. R. A. Stewart, Mrs. W. Whitaker Thompson, Mrs. R. A. Thurburn, S. S. Timmis, Mrs. Hill Toller, Rt. Hon. Sir George O. Trevelyan, Bart., O.M., P. W. Tulloch, A. J. Waley, W. G. Weller, Miss A. Whelpdale, Mrs. A. W. Willis.

Fellows resident abroad (2).—H. M. Eddie (British Columbia), Ernest A. Pearson (West Africa).

Associates (7).—Miss M. M. Allwork, Miss J. T. Armstrong, Miss E. Bennett, Miss G. Edelstein, S. Farnes, Miss N. Hutchinson, F. Johnson.

Society Affiliated (1).—Norbury Cottage Garden Society.

A lecture on "Some Flowers of Eastern and Central Africa" was given by Miss M. H. Mason (see p. 8).

GENERAL MEETING.

March 4, 1913.

Sir John T. D. Llewelyn, D.L., V.M.H., in the Chair.

Fellows elected (66).—G. H. Addy, F.R.G.S., R. W. Ascroft, Mrs. R. Bacon, Miss A. G. Bingley, Lady May Boothby, G. C. Bowden, Mrs. Ivon Braby, J. Clifford Bright, Hon. Mrs. Prideaux Brune, Miss J. S. Castleden, Miss A. Chapman, R. Cobb, Miss F. Courtney, Baroness Hilda Deichmann, Mrs. R. F. de Salis, A. Dowie, Hon. Frances M. Farrer, Mrs. H. M. Farrer, Mrs. Woulfe Flanagan, Mrs. S. Gabriel, Major S. H. Galbraith, Mrs. H. Goring, G. W. Harrison, L. L. R. Hausburg, R. C. Henderson, J.P., Mrs. G. H. Hewett, A. E. Hitchens, Mrs. R. Hoskins, Mrs. A. Ind, Mrs. Innes-Taylor, S. Japhet, Dr. L. V. Jones, Mrs. Wallis King, Miss E. S. Lefevre, F. J. P. Loud, J. E. Middleton, Mrs. H. C. Moffat, H. G. Morgan, Mrs. Nottidge, Mrs. T. G. Owens, Mrs. W. H. Paterson, W. T. Pepper, A. Poole, Mrs. K. Prescott, W. Pryce, H. R. Rabbetts, Mrs. E. M. Rodgers, P. Shoosmith, A. A. Silvester, Miss S. W. Sloper, F. Smith, Mrs. H. Russell Smith,

Mrs. K. S. E. Smith, Mrs. Yorke Smith, Mrs. M. M. Speakman, Mrs. H. G. Spicer, A. Train, H. G. Tyson, Miss V. Warren, Miss E. Warrington, Miss A. E. Watson, N. Whitehead, Miss M. A. Wilkins, Mrs. H. Wood, H. Wyatt, Mrs. Young.

Fellows resident abroad (4).—A. F. Barker (Canada), H. A. Cannon (Gold Coast), J. Lambourne (India), J. E. Williams (Transvaal).

Associates (27).—Miss M. B. Bruce, Miss T. L. Caldwell, Miss A Clough, Miss E. L. Coode, Miss H. Darbishire, Miss S. Dill, Miss M. Diodati, Miss D. Durrell, Miss P. Farrer, P. F. Follwell, Miss P. Fry, Miss M. Gill, Miss E. G. Gladding, Miss E. M. Hoskyn, G. Hyland, Miss R. Jackson, Miss S. Knight, Miss M. E. Merryweather, Miss A. Middleton, Miss E. Nightingale, Miss J. C. Scott, Miss D. B. Taylor, Miss W. Warbury, Miss H. M. Weber, Miss M. E. Whitehorn, Miss D. Wilson, Miss G. Wilson.

Affiliated Societies (3).—Gothic Horticultural Society, National Hardy Plant Society, Skenfrith and District Horticultural Society.

A lecture on "The Spring Flower Garden" was given by Mr. W. H. Divers, V.M.H. (see p. 16).

SPRING SHOW OF BULBS.

Tuesday and Wednesday, March 4 and 5, 1913.

Hyacinths, Tulips, and Daffodils.

The Council offered (subject to the General Rules of the Society) the following Prizes presented to them by the General Bulb Growers' Society of Haarlem :—

Division I.—For Amateurs.

Class 3.—Eighteen Hyacinths, distinct.

First Prize, £6 6*s*.; Second, £5 5*s*.; Third, £4 4*s*.; Fourth, £3 3*s*.; Fifth, £2 2*s*.; Sixth, £1 1*s*.

1. F. R. Dixon-Nuttall, Esq., Ingleholme, Ecclestone Park, Prescot, Lancs. (gr. J. W. Barker).
2. Duke of Portland, Welbeck Abbey, Worksop (gr. J. Gibson).
3. Mrs. H. Balfour, Langley Lodge, Headington Hill, Oxford (gr. A. Hewlett).
4. Col. The Right Hon. M. Lockwood, Bishop's Hall, Romford (gr. G. Craddick).
5. H. S. Bartlett, Esq., Severndroog, Shooter's Hill (gr. H. Agate).
6. No award.

Class 4.—Twelve Hyacinths, distinct.

First Prize, £5 5*s*.; Second, £4 4*s*.; Third, £3 3*s*.; Fourth, £2 2*s*.; Fifth, £1 1*s*.

1. Marquis of Salisbury, Hatfield House, Herts (gr. H. Prime).
2. R. G. Morrison, Esq., The Hollies, Victoria Park, Wavertree (gr. H. Raper).

3. H. G. Tyson, Esq., Hollybush Lodge, Avenue Road, Old Southgate (gr. G. T. Weddle).
4. Mrs. McDowell Nathan, Little Heath Wood, Potters Bar (gr. W. H. Newton).
5. Lady Tate, Park Hill, Streatham Common (gr. W. Howe).

Class 5.—Six Hyacinths, distinct.

First Prize, £2 2s.; Second, £1 10s.; Third, £1 1s.; Fourth, 10s.

1. A. Hanson, Esq., Ivanhoe, Victoria Park, Wavertree, Liverpool.
2. Lord Hillingdon, Wildernesse, Sevenoaks (gr. J. Shelton).
3. Mrs. A. Levita, Norton Priory, Chichester (gr. H. Edwards).
4. Earl of Lytton, Knebworth, Herts (gr. H. Brotherston).

Class 6.—Four pans containing Hyacinths, ten bulbs of one variety in each pan. The blooms of each pan to be of distinctly different colour from those of the other three pans. The bulbs need not have been actually grown in the pans they are shown in.

First Prize, £4 4s.; Second, £3 3s.; Third, £2 2s.; Fourth, £1 1s.

1. H. G. Tyson, Esq.
2. Duke of Portland.
3. Marquis of Salisbury.
4. Col. The Right Hon. M. Lockwood.

Division II.—For Trade Growers.

Class 7.—The finest decorative display of Hyacinths grown from first size bulbs.

Prize—The Gold Medal of the General Bulb Growers' Society of Haarlem.

Messrs. R. and G. Cuthbert, Southgate, N.

BULBS GROWN IN MOSS FIBRE.

Subject to the General Rules of the Society the Council also offered the following prizes, presented to them by Mr. Robert Sydenham.

Amateurs.

Classes 8–10.—Bulbs grown in Moss Fibre or similar material (not earth) and without drainage.

Class 8.—Six single Hyacinths, in separate vases, not exceeding six inches in diameter, to be selected from any one of the following varieties: 'Boerhave,' 'City of Haarlem,' 'Enchantress,' 'General Vetter,' 'Innocence,' 'Ivanhoe,' 'Jacques,' 'Johan,' 'King of the Blues,' 'Koh-i-Noor,' 'Lady Derby,' 'La Grandesse,' 'Queen Mary,' 'Schotel,' 'Totula,' 'Victory.'

1. Lady Tate.
2. Miss Gordon Thompson, The Elms, Potters Bar.
3. The Hon. Mrs. Guy Baring, St. Cross Mill, Winchester.

Class 9.—Six vases of Tulips (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be

selected from the following: 'Fabiola,' 'Joost van Vondel,' 'Keizerskroon,' 'Le Rêve,' 'Mon Trésor,' 'Pink Beauty,' 'Prince of Austria,' 'Queen of the Netherlands,' 'Red Admiral,' 'Rose Luisante,' 'Van der Neer,' 'Vermilion Brilliant,' 'White Joost van Vondel.'

Prizes, 21*s.*, 17*s.* 6*d.*, 15*s.*, 10*s.* 6*d.*, 7*s.* 6*d.*

1. Lady Tate.
2. The Hon. Mrs. Guy Baring.
3. Miss Gordon Thompson.

Class 10.—Six vases of Narcissi (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following: 'Albatross,' 'Bianca,' 'Blood Orange,' 'Bullfinch,' 'Cardinal,' 'C. J. Backhouse,' 'Cresset,' 'Dairymaid,' 'Diadem,' 'Emperor,' 'Firebrand,' 'Glitter,' 'Gloria Mundi,' 'Golden Dell,' 'Goldfinch,' 'Horace,' 'Mrs. H. J. Veitch,' 'Lilian,' 'Lucifer,' 'Lulworth,' 'Madame de Graaff,' 'Seagull,' 'Victoria,' 'Wheatear,' 'White Lady,' 'Will o' the Wisp.'

Prizes, 21*s.*, 17*s.* 6*d.*, 15*s.*, 10*s.* 6*d.*, 7*s.* 6*d.*

1. Lady Tate.
2. The Hon. Mrs. Guy Baring.

GENTIAN CUP COMPETITION.

MARCH 4 AND 5, 1913.

The Council offered (subject to the General Rules of the Society, and the special Regulations indicated below) a Silver Cup presented to them by Messrs. R. Wallace for "the best exhibit by an amateur of Alpine Plants, including suitable bulbs and dwarf shrubs, in a space not exceeding 5 × 3 feet. The plants need not necessarily be in flower, but those which are will be preferred to those which are not.

"The use of stone is not absolutely necessary, but the Judges will be instructed to favour its correct use, and the natural arrangement of the plants in connexion therewith.

"The plants may be either in pots or as lifted."

Sir Everard A. Hambro, K.C.V.O., Hayes Place, Hayes, Kent (gr. J. Grandfield).

GENERAL MEETING.

MARCH 18, 1913.

Mr. CHARLES G. A. NIX in the Chair.

Fellows elected (76).—Mrs. Alldritt, J. Chapman Anderson, E. P. Arnold, Miss K. Ashley, W. J. Aubert, Mrs. John Baird, H. A. Baker, Mrs. F. Beadle, Mrs. T. Blackwell, Miss H. F. Boghurst-Fisher, T. Bratherton, Mrs. E. C. Browne, E. Burtt, Mrs. Carroll, Mrs. Chute, Ernest Clark, Miss F. Cole, J. E. Cowen, Mrs. Christie-Crawfurd, Lady Emma Crichton, Mrs. Crossley, W. Munro Cunningham, D. W.

Dowthwaite, G. H. Everett, G. J. Eveson, Miss R. Franklin, W. F. Fremlin, Rev. C. W. Fullmer, E. T. Gibbs, R. Goodwin Golby, Miss I. Harding, L. Harrison, H. A. Hill, Mrs. W. Holding, Mrs. George Hooper, W. Horne, J. R. Hortor, Col. H. Huleatt, L. Lister Kaye, Mrs. Gustave Kohn, Mrs. Leney, F. Lubbock, Mrs. J. A. Lumsden, Miss E. M. Lyell, C. T. Mackintosh, Stuart Maples, Mrs. C. F. Marsh, Mrs. Moore, Miss E. G. Mundy, H. F. Norton, H. Oakley, C. A. Odams, Arthur W. Orwin, M.D., A. E. Parker, S. Compigné Parker, E. W. Philbrick, Mrs. Praschkauer, E. W. Presgrave, Rev. J. Caerau Rees, W. R. Saunders, H. S. Savill, Miss H. F. M. Sidney, Mrs. A. H. Stockley, Mrs. Sworder, E. Thornton-Smith, Mrs. E. H. Tuckwell, A. Turner, jun., Miss A. M. Twining, A. Walker, M.A., Mrs. S. C. Watney, Miss K. H. Wells, Miss M. M. Wells, Lady Lilian Wemyss, Leslie Wilson, S. Wingrove, Mrs. Wombwell.

Associates (2).—Miss E. Colson, J. O. Neumann.

Society Affiliated (1).—Monks Risborough Horticultural Society.

A lecture on "The Romance of Weeds" was given by Mr. R. Lloyd Praeger, B.E., B.A., M.R.I.A.

GENERAL MEETING.

April 1, 1913.

Mr. George Gordon, V.M.H., in the Chair.

Fellows elected (59).—R. Adamson, Mrs. Alston, Mrs. A. Barlow, Miss M. Barron, G. Beaton, G. Beckwith, A. B. Birnbaum, E. J. Boake, Mrs. M. E. Browning, Mrs. R. Bryans, Mrs. W. Burness, Mrs. A. E. Butter, C. du P. Chiappini, The Countess of Chichester, Mrs. C. F. Clapham, Mrs. Walters Clark, Mrs. A. B. Cloutman, Harold Cox, C. H. Crawley, Mrs. Dardier, Mrs. F. Hermitage Day, Miss J. Garner, Miss C. C. Hall, Mrs. E. L. Hamilton, Mrs. G. Henderson, W. Hoade, W. Holder, Miss M. E. Horniblow, F. V. Howell, Mrs. Curling Hunter, W. J. Joce, Lady Maud Keith-Falconer, A. Key, H. Kingham, Mrs. H. Lancaster, Hon. Mrs. Walter Lindley, Mrs. H. Lucas, Lady Markham, A. Maxim, C. W. Mayne, J. Milne, G. E. Morrell, C. O. E. Nicholson, W. H. Phelp, J. H. Preston, J.P., W. Roderwald, Mrs. R. Ross, Miss N. Scott-Russell, Mrs. A. J. Stone, Mrs. Thomas, Mrs. B. T. L. Thomson, Mrs. S. P. Triana, Miss M. H. Wanklyn, Miss C. R. Whitton, J. W. H. Williams, A. Wood, Mrs. Woodcroft, Mrs. A. H. Young, Sir Francis Younghusband, K.C.I.E.

Fellows resident abroad (8).—S. N. Chatterjee (India), M. C. Cottam (Canada), Miss D. Gibson (Australia), Mrs. S. W. Gibson (Australia), S. T. Illman (Uganda), Lester L. Morse (California), B. Saunders (Canada), S. M. Shafi (India).

Associates (2).—Miss H. Andrew, V. Buckholz.

A lecture on "The Literature of the Roses" was given by Mr. Arthur W. Paul (see p. 29).

DEPUTATION TO TRURO.

On Monday, April 7, a Deputation consisting of Messrs. W. A. Bilney, W. B. Cranfield, C. G. A. Nix, James Hudson, V.M.H., and the Rev. W. Wilks, M.A., V.M.H., went down to Truro on the invitation of the Committee of the Cornwall Daffodil and Spring Flower Show. The Deputation assembled on Tuesday morning at the Skating Rink, Truro, where the Show was held. The weather was dry, but, for Cornwall, exceedingly cold. After carefully inspecting all the exhibits in the Show the Deputation made the following awards:—

Gold Medal.

To T. A. Dorrien-Smith, Esq., Isles of Scilly, for very rare flowering shrubs, some of which are mentioned below.

Silver-gilt Flora Medal.

To J. C. Williams, Esq., Caerhays Castle, for flowering shrubs.
To Mr. Chris. Bourne, Bletchingley, for Daffodils.
To Messrs. Barr, Covent Garden, for Daffodils.

Silver-gilt Banksian Medal.

To Rev. A. T. Boscawen, Ludgvan, for flowering shrubs.

Silver Flora Medal.

To J. C. Williams, Esq., Caerhays Castle, for Daffodils.
To P. D. Williams, Esq., Llanarth, for Daffodils.
To Mr. Reuthe, Keston, for a group of plants.
To Messrs. R. Veitch, Exeter, for a group of plants.

Silver Banksian Medal.

To Mrs. Soltau Symons, for Daffodils.
To Mr. Martin, Truro, for Daffodils.
To J. C. Williams, Esq., Caerhays Castle, for small Rhododendrons.
To R. Fox, Esq., Penjerick, for flowering shrubs.
To T. B. Bolitho, Esq., Trewidden, Penzance, for flowering shrubs.
To P. D. Williams, Esq., Llanarth, for flowering shrubs.

First Class Certificate.

To *Grevillea Hookeriana*, from Rev. A. T. Boscawen, Ludgvan Rectory.

Some of the plants shown by Mr. Dorrien-Smith were: *Brachyglottis repanda*, *Arctotis grandiflora*, *Arctotis* species, *Sophora tetraptera grandiflora*, *Acacia myrtifolia*, *Coleonema album*, *Beschorneria yuccoides*, *Leucopogon lanceolatum*, *Pittosporum Tobira*, *Acacia cyanophylla*, *Pittosporum Tobira variegatum*, *P. tenuifolium Mayi*, *P. tenuifolium*, *P. crassifolium*, *P. Colensoi* (2 forms), *P. cornifolium*, *P. umbellatum*, *P. bicolor*, *P. undulatum*, *P. Ralphii*, *Correa picta*, *Agonis marginata*, *Illicium anisatum*, *Psoralea affinis*, *Fuchsia serratifolia*, *Echium fastuosum*, *Echium callithyrsum* and *E. hybrida*, *Correa bicolor*, *Kennedya nigricans*, *Grevillea rosmarinifolia*, *Sedum arboreum*,

Correa alba, Grevillea alpina, Fuchsia cordifolia, Grevillea Thelemanniana, Correa speciosa Harrisi, Fuchsia excorticata, Acacia Berteriana, Correa magnifica, C. cardinalis, C. ventricosa, Acacia longiflora, Grevillea sulphurea, Correa virens, Arctotis arborescens, Correa carnea.

It should be added that the Deputation were most hospitably entertained at luncheon by A. P. Nix, Esq., one of the members of the Truro Local Committee.

The Council of the Society desired a special vote of thanks to be sent to Mr. Nix.

Lord and Lady Falmouth most kindly invited the Deputation for tea in the afternoon, when the glorious gardens at Tregothnan were seen. The Deputation brought away with them from Truro most kindly remembrances of the warmth of Cornish hospitality.

GENERAL MEETING.

April 15, 1913.

Mr. J. Abercromby Alexander, F.R.G.S., in the Chair.

Fellows elected (71).—Mrs. Bergheim, L. Boycott, Mrs. Caspersz, Sir Mackenzie Chalmers, K.C.B., C.S.I., Mrs. F. Clayton, H. F. Cotton, W. Cowper-Coles, C. Cragnell, Mrs. F. W. B. Cripps, Mrs. G. Cunard, F. Dawe, Baron de Oliveira, W. H. Dunnett, Miss F. M. Durham, E. Elvin, Dr. G. S. Ewen, Miss A. Fenwick, Mrs. G. A. Fenwick, E. Forder, Lachlan Gibb, J.P., F.E.S., W. W. Gibbins, W. F. Grimmett, R. B. Hamilton, R. L. Harmsworth, Miss E. A. Hayes, H. T. Holloway, Mrs. H. T. Holloway, Mrs. Eardley-Wilmot Holt, Mrs. H. B. Hopgood, A. B. Howitt, Mrs. J. Hutchinson, W. H. James, Miss J. F. C. Jenkins, Capt. Sir Eustace Clarke Jervoise, Bart., R. S. Johns, Mrs. R. S. Johns, Mrs. G. Lawrence, Miss A. C. Lobb, A. C. Lyell, Mrs. McArthur, W. McOnegal, Lady Makins, S. Marshall, Mrs. G. St. J. Mildmay, W. H. Monk, A. W. Mummery, Mrs. G. Norman, R. E. Peake, H. E. Pearce, W. P. Phelps, Mrs. W. Pitt, Miss M. M. Robins, Lady Robinson, J. J. P. Scott, B.A., S. F. Staffurth, M.A., F. S. Stenning, Mrs. E. G. Stevenson, Mrs. R. Taylor, Rev. E. J. Teesdale, C. A. Thomas, Miss G. J. Thompson, Miss R. Thynne, Mrs. F. N. Trier, Miss F. M. Verrall, O. E. Warburg, M. H. Ward, G. West, Miss M. Wilson, Mrs. E. W. Wimperis, V. H. Winny, W. T. Woods.

Fellows resident abroad (6).—A. Brémond (France), F. Carr (Canada), R. M. Mattocks (Canada), R. F. Murchison (Italy), Jan Roes (Holland), C. Zeestraten (Holland).

Associates (2).—T. Collier, Miss D. M. E. Gairdner.

Society affiliated (1).—Royal Horticultural Society of Victoria.

A lecture on "The Origin of Life—Undiscoverable," was given by the Rev. Professor G. Henslow, M.A., V.M.H. (see p. 39).

SHOW OF DAFFODILS.

TUESDAY AND WEDNESDAY, APRIL 15 AND 16, 1913.

SECTION I.

Open Classes.

(Exhibitors in Section I. may not compete in Sections II. and III.)

Class 1.—Collection of Daffodils, 48 varieties, distinct, fairly representing the different Divisions. Three stems of each.

First Prize, Gold Medal or Silver Cup and £1 ; Second, Silver-gilt Flora Medal and £1 ; Third, Silver Flora Medal and £1.

1. E. M. Crosfield, Esq., Cossington House, Bridgwater.
2. F. H. Chapman, Esq., Rotherside Gardens, Rye, Sussex.
3. C. Bourne, Esq., Olde Wharf House, Simpson, Bletchley.

Class 2.—Twelve Long Trumpet Daffodils, distinct varieties. (Division I.) Three stems of each.

First Prize, Silver-gilt Flora Medal and £1 ; Second, £1 ; Third, 10s.

1. Messrs. E. H. Krelage & Son, Bloemhof, Haarlem.
2. Messrs. Cartwright & Goodwin, Kidderminster.
3. W. A. Watts, Esq., Bronwylfa, St. Asaph, N. Wales.

Class 3.—Twelve Incomparabilis Daffodils, distinct varieties. (Division II.) Three stems of each.

First Prize, Silver-gilt Flora Medal and £1 ; Second, £1 ; Third, 10s.

1. W. A. Watts, Esq.
2. Messrs. Cartwright & Goodwin.
3. No award.

Class 4.—Twelve Barrii Daffodils, distinct varieties. (Division III.) Three stems of each.

First Prize, Silver gilt Flora Medal and £1 ; Second, £1 ; Third, 10s.

1. C. Bourne, Esq.
2. F. H. Chapman, Esq.
3. W. A. Watts, Esq.

Class 5.—Nine Leedsii Daffodils, distinct varieties. (Division IV.) Three stems of each.

First Prize, Silver-gilt Flora Medal and £1 ; Second, £1 ; Third, 10s.

1. C. Bourne, Esq.
2. Messrs. Cartwright & Goodwin.
3. W. A. Watts, Esq.

Class 6.—Nine Poeticus Daffodils, distinct varieties. (Division IX.) Three stems of each.

First Prize, Silver-gilt Flora Medal and £1 ; Second, £1 ; Third, 10s.

1. C. Bourne, Esq.
2. F. H. Chapman, Esq.
3. W. A. Watts, Esq.

Class 7.—Nine Daffodils, distinct varieties, selected from Divisions V., VI., and VII. Three stems of each.

First Prize, £1; Second, 15*s.*; Third, 10*s.*

No award.

Class 8.—Nine Polyanthus (Tazetta) Daffodils, including Poetaz varieties; distinct. (Division VIII.) Three stems of each.

First Prize, 10*s.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. Messrs. Cartwright & Goodwin.
2. W. A. Watts, Esq.
3. No award.

Class 9.—Six Double Daffodils, distinct varieties. (Division X.) Three stems of each.

First Prize, 10*s.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. W. A. Watts, Esq.
2. Messrs. Cartwright & Goodwin.
3. No award.

Section II.

Amateurs only.

All flowers in this Section must be in commerce.

(Exhibitors in Section II. may not compete in Sections I. and III.)

Class 10.—Collection of Daffodils, 24 varieties, distinct, fairly representing the different Divisions. Three stems of each.

First Prize, Silver Cup and £1; Second, Silver-gilt Flora Medal and 15*s.*; Third, Silver Banksian Medal and 10*s.*

1. N. G. Lower, Esq., Presteign, Radnor.
2. S. F. Staffurth, Esq., Frieston Priory, Boston.
3. Rev. T. Buncombe, The Rectory, Black Torrington, N. Devon.

Class 11.—Six Long Trumpet Daffodils, distinct varieties. (Division I.) Three stems of each.

First Prize, 15*s.*; Second, 10*s.*; Third, 7*s.* 6*d.*

1. Rev. T. Buncombe.
2. W. B. Cranfield, Esq., East Lodge, Enfield Chase.
3. S. F. Staffurth, Esq.

Class 12.—Six Incomparabilis Daffodils, distinct varieties. (Division II.) Three stems of each.

First Prize, 15*s.*; Second, 10*s.*; Third, 7*s.* 6*d.*

1. W. B. Cranfield, Esq.
2. H. R. Darlington, Esq., Park House, Potter's Bar.
3. S. F. Staffurth, Esq.

Class 13.—Six Barrii Daffodils, distinct varieties. (Division III.) Three stems of each.

First Prize, 15*s.*; Second, 10*s.*; Third, 7*s.* 6*d.*

1. S. F. Staffurth, Esq.
2. H. R. Darlington, Esq.
3. Rev. T. Buncombe.

Class 14.—Six Leedsii Daffodils, distinct varieties. (Division IV.) Three stems of each.

First Prize, 15*s.*; Second, 10*s.*; Third, 7*s.* 6*d.*

1. H. R. Darlington, Esq.
2. S. F. Staffurth, Esq.
3. Rev. T. Buncombe.

Class 15.—Six Poeticus Daffodils, distinct varieties. (Division IX.) Three stems of each.

First Prize, 15*s.*; Second, 10*s.*; Third, 7*s.* 6*d.*

1. H. R. Darlington, Esq.

2 and 3. No award.

Class 16.—Six Hybrid Triandrus Daffodils, distinct varieties. (Division V.) One stem of each.

First Prize, 15*s.*; Second, 10*s.*; Third, 7*s.* 6*d.*

No award.

Class 17.—Six Polyanthus (Tazetta) Daffodils, including Poetaz varieties; distinct. (Division VIII.) Three stems of each.

First Prize, 10*s.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. H. R. Darlington, Esq.

2 and 3. No award.

Class 18.—Three Double Daffodils, distinct varieties. (Division X.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. H. R. Darlington, Esq.
2. W. B. Cranfield, Esq.
3. No award.

Section III.

Amateurs only.

All flowers in this Section must be in commerce.

(Exhibitors in Section III. may not compete in Sections I. and II.)

Class 19.—Twelve Daffodils, distinct varieties, fairly representing the different Divisions. Three stems of each.

First Prize, Silver-gilt Banksian Medal and 10*s.* 6*d.*; Second, Silver Flora Medal and 7*s.* 6*d.*; Third, Silver Banksian Medal and 5*s.*

1. R. Morton, Esq., Grange Dene, Woodside Park, N.
2. Rev. Canon W. W. Fowler, Earley Vicarage, Reading.
3. G. Stocks, Esq., 44 Bentley Road, Doncaster.

Class 20.—Three Trumpet Daffodils, distinct varieties. (Division Ia.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. No award.
2. R. Morton, Esq.
3. No award.

Class 21.—Three Trumpet Daffodils, distinct varieties. (Division Ib.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. No award.
2. R. Morton, Esq.
3. No award.

Class 22.—Three Trumpet Daffodils, distinct varieties. (Division Ic.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. No award.
2. No award.
3. R. Morton, Esq.

Class 23.—Three Incomparabilis Daffodils, distinct varieties. (Division IIa.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. R. Morton, Esq.
2 and 3. No award.

Class 24.—Three Incomparabilis Daffodils, distinct varieties. (Division IIb.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. R. Morton, Esq.
2. Rev. Canon W. W. Fowler.
3. No award.

Class 25.—Three Barrii Daffodils, distinct varieties. (Division IIIa.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. No award.
2. R. Morton, Esq.
3. No award.

Class 26.—Three Barrii Daffodils, distinct varieties. (Division IIIb.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. R. Morton, Esq.
2 and 3. No award.

Class 27.—Three Leedsii Daffodils, distinct varieties. (Division IV.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. No award.
2. R. Morton, Esq.
3. No award.

Class 28.—Three Hybrid Triandrus Daffodils, distinct. (Division V.) One stem of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

No award.

Class 29.—Three Polyanthus (Tazetta) Daffodils, including Poetaz varieties; distinct. (Division VIII.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

No award.

Class 30.—Three Poeticus Daffodils, distinct varieties. (Division IX.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

1. No award.
2. Rev. Canon W. W. Fowler.
3. No award.

Class 31.—Three Double Daffodils, distinct varieties. (Division X.) Three stems of each.

First Prize, 7*s.* 6*d.*; Second, 5*s.*; Third, 3*s.*

No award.

Section IV.

Seedling and New Daffodils—Open Classes.

Class 32.—Twelve Daffodils, distinct varieties, introduced into commerce during or since 1909. One stem of each.

First Prize, The R.H.S. Standard Silver Cup; Second, Silver-gilt Flora Medal and 15*s.*; Third, Silver Flora Medal and 10*s.*

1. C. Bourne, Esq.
2. F. H. Chapman, Esq.
3. No award.

Class 33.—Twelve Daffodils, distinct varieties, not in commerce. One stem of each.

First Prize, R.H.S. Silver Cup; Second, Silver-gilt Flora Medal and £1; Third, Silver Flora Medal and 15*s.*

1. E. M. Crosfield, Esq.
2. W. Welchman, Esq., Birdbeck House, Upwell, Wisbech.
3. F. H. Chapman, Esq.

Class 34.—Six Daffodils, distinct varieties, not in commerce. One stem of each.

First Prize, Silver-gilt Banksian Medal and £1; Second, Silver Flora Medal and 15*s.*; Third, Silver Banksian Medal and 10*s.*

1. C. Bourne, Esq.
2. W. A. Watts, Esq.
3. J. Mallenden, Esq., Scrooby, Bawtry, Yorks.

Class 35.—Three Daffodils, distinct varieties, not in commerce. One stem of each.

First Prize, Silver Flora Medal and 10*s.*; Second, Silver Banksian Medal and 7*s.* 6*d.*; Third, 7*s.* 6*d.*

1. No award.
2. Messrs. Cartwright & Goodwin.
3. No award.

Class 36.—Twelve Hybrid Triandrus Daffodils, distinct varieties, not in commerce. One stem of each.

First Prize, Silver-gilt Flora Medal and 15*s.*; Second, Silver Flora Medal and 10*s.*; Third, Silver Banksian Medal and 7*s.* 6*d.*

1. E. M. Crosfield, Esq.
2. W. A. Watts, Esq.
3. F. H. Chapman, Esq.

Class 37.—Six Seedling Daffodils, distinct, not in commerce, raised by the exhibitor. One stem of each.

First Prize, R.H.S. Silver-gilt Cup; Second, Silver-gilt Flora Medal; Third, Silver Flora Medal.

1. A. M. Wilson, Esq., Shovell, Bridgwater.
2. P. D. Williams, Esq., Lanarth, St. Keverne, Cornwall.
3. W. Welchman, Esq.

Class 38.—Three Seedling Daffodils, distinct, not in commerce, raised by the Exhibitor. One stem of each.

First Prize, Silver-gilt Flora Medal; Second, Silver Flora Medal; Third, Silver Banksian Medal.

1. W. A. Watts, Esq.
2. T. Batson, Esq., Beaworthy, N. Devon.
3. Rev. T. Buncombe.

Class 39.—One Trumpet Daffodil. (Division Ia.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. W. Welchman, Esq.
2. T. Batson, Esq.
3. C. Bourne, Esq.

Class 40.—One Trumpet Daffodil. (Division Ib.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. E. M. Crosfield, Esq.
2. W. Welchman, Esq.
3. P. D. Williams, Esq.

Class 41.—One Trumpet Daffodil. (Division Ic.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. P. D. Williams, Esq.
2. W. Welchman, Esq.
3. Messrs. Cartwright & Goodwin.

Class 42.—One Incomparabilis Daffodil. (Division IIa.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. A. M. Wilson, Esq..
2. Messrs. Cartwright & Goodwin.
3. No award.

Class 43.—One Incomparabilis Daffodil. (Division IIb.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. E. M. Crosfield, Esq.
2 and 3. No award.

Class 44.—One Barrii Daffodil. (Division IIIa.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. A. M. Wilson, Esq.
2. P. D. Williams, Esq.
3. W. A. Watts, Esq.

Class 45.—One Barrii Daffodil. (Division IIIb.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. P. D. Williams, Esq.
2. A. M. Wilson, Esq.
3. E. M. Crosfield, Esq.

Class 46.—One Leedsii Daffodil. (Division IV.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. P. D. Williams, Esq.
2. W. B. Cranfield, Esq.
3. C. Bourne, Esq.

Class 47.—One Hybrid Triandrus Daffodil. (Division V.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. E. M. Crosfield, Esq.
2. P. D. Williams, Esq.
3. Messrs. Cartwright & Goodwin.

Class 48.—One Hybrid Jonquilla Daffodil. (Division VII.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. E. M. Crosfield, Esq.
2. P. D. Williams, Esq.
3. No award.

Class 49.—One Poetaz Daffodil. (Division VIII.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. P. D. Williams, Esq.
2 and 3. No award.

Class 50.—One Poeticus Daffodil. (Division IX.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. A. M. Wilson, Esq.

2. E. M. Crosfield, Esq.
3. P. D. Williams, Esq.

Class 51.—One Double Daffodil. (Division X.) Not in commerce. One stem.

First Prize, 10*s.* 6*d.*; Second, 7*s.* 6*d.*; Third, 5*s.*

1. W. A. Watts, Esq.
2. Messrs. Cartwright & Goodwin.
3. No award.

Section V.

Open to all Amateurs,

Irrespective of whether they are, or are not, competing in any of the previous sections.

Class 52.—A collection of Daffodils:—consisting of three stems each of fifty distinct varieties fairly representing Divisions I., II., III., IV., V., IX., and X. (see "Classification of Daffodils, 1910"). Divisions VI. and VII. optional, Divisions VIII. and XI. excluded.

The Council accepted the prizes offered in this class by Messrs. Barr and Sons, for award at the Daffodil Show.

First Prize, the Barr Silver Daffodil Vase; Second, £3; Third, £2.

No entry.

GENERAL MEETING.

April 29, 1913.

Mr. H. B. May, V.M.H., in the Chair.

Fellows elected (71).—A. J. Allen, Lady Ampthill, Miss L. C. Anderson, R. H. Bailey, Mrs. W. W. Bakewell, H. Balchin, Mrs. Beecheno, Miss C. M. Bell, W. Bentley, Miss J. A. Blues, Major F. H. Bowater, H. Buckmaster, Mrs. H. S. Cautley, G. Cheesman, A. Christie, Capt. R. Muirhead Collins, R.N., C.M.G., Mrs. Crundwell, Rev. A. Cuming, Miss G. L. Dalrymple, M. S. David, A. Davis, Mrs. E. S. Davison, Mrs. Duffus, P. E. Durcan, E. Lake Ferraby, Miss M. Fletcher, Miss E. Gaisford, A. W. Gardner, C. L. Gimblett, Miss K. Grieve, Mrs. C. B. Hall, H. J. Hamilton, Rev. A. Hanbury, Miss E. Hardy, Miss E. P. Hodgson, Mrs. B. Holmes, Mrs. A. Hughes, H. R. Humphries, B. Ionides, Miss M. Johnson, J. E. King, Miss K. M. Knowlman, Mrs. P. Le Breton, Lady Levy, Miss E. E. Maës, Mrs. J. T. Marsh, Mrs. H. P. Mortimer, Mrs. A. C. Nathan, Mrs. F. C. C. Nielsen, The Duchess of Norfolk, Lady Northbourne, Miss M. J. O'Donnell, Lady Prichard Jones, Mrs. W. M. Ratcliff, Miss M. Ribbon, H. Richardson, J. Topham Richardson, J. K. M. Ross, Miss E. Ross, E. D. Rowlands, Mrs. J. D. Sims, B. F. Smith, Mrs. P. K. Stothert, Mrs. H. K. Studd, Miss C. Thomas, R. J. P. Thomas, C. H. Tones, Mrs. F. Walker, Mrs. G. L. Walker, Mrs. W. Warner, Mrs. Wenham.

Fellows resident abroad (6).—E. Battiscombe (B. E. Africa), L. Brémond (France), R. W. Gosset (Solomon Islands), H. F. Hansen (N.Z.), M. Hémeray-Aubert (France), Prasanna Nath (Bengal).

Societies affiliated (3).—Chigwell Horticultural Society, East Bradford Horticultural Society, Lee, Blackheath, and Lewisham Horticultural Society.

SCIENTIFIC COMMITTEE.

JANUARY 7, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S. in the Chair, and eight members present.

Adioda × *' St. Fuscien.'*—Messrs. Charlesworth, Haywards Heath, sent a hybrid between *Ada aurantiaca* and *Cochlioda Noezliana* with narrow-petalled flowers of a deep red colour on a many-flowered raceme. This cross was first shown on August 29, 1911, by M. Graire, and it had been raised by Messrs. Charlesworth simultaneously. The Committee unanimously recommended that Certificates of Appreciation should be awarded to both M. Graire and Messrs. Charlesworth & Co.

Cycnoches Cooperi.—Messrs. Sander showed a plant under this name which was thought by some to be identical with *C. pentadactylon*, but Mr. Rolfe reports that, though very similar in structure to that species, it is quite different in colour, the sepals and petals being of a nearly uniform mahogany-brown, and there are also some differences in the details of the lip. It would therefore appear to be sufficiently distinct to warrant a new name, and the Award of Merit recommended, subject to the name being found correct, therefore stands.

Epidendrum ciliare × *Laelia cinnabarina.*—Mr. J. O'Brien, V.M.H., showed flowers of a hybrid between these two plants, pointing out that, though not very conspicuous, the markings on the lip followed the remarkable fringing of the *Epidendrum* parent and the form of the lip was markedly elongated.

Miltonia vexillaria × *Odontoglossum crispum.*—At the corresponding meeting last year M. Firmin Lambeau showed a seedling (*Odontonia* × *Firminii*) of this cross, and the Committee requested that further plants of the same raising should be shown when the opportunity occurred. M. Lambeau now sent two more plants bearing flowers very similar in appearance, and leaving no doubt that the parentage stated originally was correct.

Datura arborea.—Mr. Holmes, F.L.S., showed a flower of *D. arborea* bearing a white outgrowth from the outside of the corolla similar to those which occur frequently in Gloxinias and other plants.

Insect attacking Fennel.—Mr. Holmes also showed a number of insects belonging to the genus *Typhlocyba* (leaf-hoppers). Few insects attack the Fennel, possibly owing to the oil it contains.

Grouse eating Willow buds.—Mr. F. M. Ogilvie sent shoots of a Willow on which he had seen grouse feeding in Argyllshire. The crop of the grouse was full of the buds. The Willow appeared to be *Salix repens*, an apparently uncommon food plant for grouse in Britain.

Cyclamen with branching inflorescence.—Mr. Hawkes, of Osterley Park Gardens, sent shoots of Cyclamen bearing leaves springing from the peduncles, and in their axils other flowers. These branching peduncles of Cyclamen appear not uncommon in collections where the plants are growing with unusual vigour.

Gall on root of Thuya.—A large globular growth the size of a cricket ball was shown on the root of a Thuya. It was very similar in appearance and structure to those not uncommon on the roots of Loganberries and other plants, and was possibly allied to the crown-gall which attacks so many widely different plants.

SCIENTIFIC COMMITTEE, JANUARY 21, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and ten members present.

Dendrobium fuscescens.—Mr. O'Brien, V.M.H., showed a specimen of this curious species with brown flowers from the Himalayan region. It is figured in Griffiths' *Icon. Plant. Asiat.* t. cccix., and belongs to the section included by Lindley in his genus *Sarcopodium* (see Lindley's *Folia Orchidarum*), along with *D. Coelogyne, D. amplum*, and *D. rotundatum.* Lindley considered the genus *Sarcopodium* intermediate between *Dendrobium* and *Bulbophyllum*, but later botanists have divided it, putting some of the species in *Bulbophyllum* and some in *Dendrobium.* It may be noted that the technical descriptions published of the species describe two orange spots on the column, but there are really three, one of them being quite low down.

Apples with many or no pips.—Mr. F. J. Chittenden showed specimens of the Apples, to which he had previously referred, having more than two seeds in the carpellary cavities. The variety 'Duchess' Favourite' had, as a rule, in the past season four seeds in each cell, and in one case five had been found. This is remarkable, as the number in the wild types is practically constantly two, a fact which has been used as a basis for the separation of the genera *Pyrus* and *Cydonia.* Like many other points of distinction between species and even genera, this would appear not to be absolute. He also showed specimens of an Apple sent him by Mr. P. C. M. Veitch, of Exeter, called 'No-Pip,' which was reputed to form no seeds, although the Apple was perfectly developed. Those exhibited had only the merest rudiments of seeds.

Galls on Polypodium sp. from the Gold Coast.—Mr. W. H. Patterson sent specimens of the fronds of a *Polypodium* galled along the edges of the pinnæ, and somewhat crested through the attacks of a species of *Eriophyes.* Mites belonging to this genus are well known as exciting the development of galls on all sorts of plants, and one, *E. pteridis*, and another, unnamed, are described as causing galls on the margins of fronds of *Pteris aquilina* in South Europe. Mr. Patterson finds the mite to spread but slowly among Ferns at Aburi.

Early-flowering Ash.—Mr. E. E. Turner sent from Coggeshall an example of an early-flowering species of Ash which has been identified as *Fraxinus angustifolia*. It always flowers in January, and is conspicuous by reason of the bright colouring of the flowers. Dr. Henry believes this to be the very rare variety *holotricha*.

Gall on Rubus odoratus.—Mr. Chittenden, F.L.S., showed a gall on *Rubus odoratus* involving the whole of the stem and produced by the fungus *Coniothyrium Fuckelii*. It had occurred at Wisley, and the bark had a very rough, red appearance, and was many times thicker than the normal, reaching a thickness of as much as $\frac{3}{8}$-inch in some parts.

SCIENTIFIC COMMITTEE, FEBRUARY 4, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and ten members present.

Laelia Lundii, Reichb. and Warm.—Mr. Rolfe, A.L.S., exhibited, on behalf of Messrs. Sander, a plant of this dwarf Brazilian species, remarking that it is allied to *L. Regnellii*, but is easily separated by its habit of flowering on the undeveloped growth, a character which it shares with *Cattleya Walkeriana*. The leaves are narrow and fleshy, and the flowers solitary, pale lilac with a veined blotch on the front lobe of the lip. It is quite unlike any other *Laelia* in cultivation. Its history is given in *The Orchid Review*, xviii. p. 62.

Oncidioda × *Cooksoniae.*—The Orchid Committee referred the plant *Oncidioda* × *Cooksoniae* to this Committee. It had been exhibited by Messrs. Charlesworth. The cross is a rather curious one between *Cochlioda Noezliana* ♀ and *Oncidium macranthum* ♂; the hybrid has something of the long raceme of its pollen parent, while the flowers are larger than the seed parent and somewhat different in colour. It was first raised by Mr. Cookson. A Botanical Certificate was unanimously recommended to the plant.

Crocus biflorus Weldenii.—Mr. Bowles showed a seedling from Messrs. Barr of this form with a distinct sulphur tinge. He found that seedlings of *chrysanthus* and *biflorus* ran into one another so as to render it impossible to regard these as anything but forms of a single species, as, indeed, Herbert had regarded them, grouping them under the name *C. annulatus*. *C. chrysanthus* gave blue seedlings similar to those of *C. biflorus* in colour.

Bitter Pit in Pear.—Some pears were shown with brown spots in the flesh similar to those frequently seen in apples. This spotting is not the product of the attack of any specific organism, but is due to some derangement in the normal development of the fruit. Mr. Massee, V.M.H., recognized the spotting of the pear flesh as of similar origin.

SCIENTIFIC COMMITTEE, FEBRUARY 18, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and ten members present.

Abies bracteata fruits.—Mr. Gordon, V.M.H., showed fruits of *Abies bracteata* from the garden of R. Barclay, Esq., Bury Hill, Dorking, where it is now fruiting for the first time. The tree was planted in the early part of the second half of the last century. *Abies bracteata* was discovered by Douglas on the high mountains of Columbia growing at an elevation of never less than 6000 feet. W. Lobb later obtained seeds, and the species was introduced in 1853. The tree at Bury Hill was one of the first to be planted in this country. The large cones are borne in clusters, and are easily recognized by the long, pointed, recurved bracts. In the specimens exhibited drops of resin had exuded on both the bracts and the leaves, giving the whole a very singular appearance.

Grubs on roots of Trollius, &c.—Mr. Bowles showed, from a garden in Sussex, grubs of the Ghost Moth, *Hepialus humuli*, which had been feeding on the roots of *Trollius* and *Helleborus*. They frequently attack Paeonies and other fleshy-rooted plants.

Smilax with curled leaves and variegation.—Specimens of *Smilax* were received from Guernsey with curled and variegated leaves, with a full report on experiments which had been tried with the object of eradicating the complaint. Mr. Bescoby, who has been investigating the matter, ascertained that in some of the soils where the disease occurred the amount of damage done was considerable, as much as 10 per cent. of the crop being affected. The Committee were of opinion that the trouble was a physiological one, and not in any way due to the attack of any organism. The remedy, therefore, lies in the alteration of some cultural details, and the fact that the treatment of the soil with boiling water had effectively prevented its occurrence in plants subsequently grown in the soil pointed to that being a suitable method to adopt.

The report sent by Mr. Bescoby is as follows :—

"In the early part of 1912 attention was called to a house of Smilax at St. Andrew's, Guernsey. The house had been planted with Smilax in September 1911, following on the removal of a Tomato crop. It had apparently never grown well, and at the time of examination the plants showed much variation in height, while on many of them the leaves showed a curious 'variegation,' and were curled as though some insect pest had been at work, or the water supply had been deficient. The patches in which the chlorophyll was absent were irregularly distributed and appeared too general to be due to any insect trouble.

"Examination revealed the presence of red spider (*Tetranychus telarius*), and the appearance of the leaf suggested that some chemical had been used of excessive strength for the purpose of combating this pest. The tissues elsewhere were quite healthy and normal. Good

fibrous roots seemed to point to sufficient food supply. There was no sign of fungoid or bacterial trouble.

"The appearance of the cells of the leaf when examined with the microscope was thought worthy of remark. The chlorophyll was distributed in patches around the periphery of the cell, and the cell contents generally drawn toward one side. It must be added that later in the season the plants still showed the 'curl' and shrivelling of the tips, though the leaves remained quite green.

"No sign of eelworm (*Heterodera radicicola*) could be found. The swollen water- and food-storing portions of the roots were firm and white. In many cases the tips of the shoots were weak and flaccid.

"The method of cultivation followed was to plant out seedlings at the end of August or early in September. A temperature of about 60° was maintained, and adequate ventilation ensured by top lights —'draughts' is the explanation advanced by one foreman employed. Water was freely supplied in addition to frequent spraying to keep down red spider, and doses of liquid manure supplied about every three weeks. A special mixed manure was also supplied freely.

"During 1912 the same symptoms have developed to a serious extent in other houses containing Smilax plants in every stage from seedlings upwards. The Smilax on this estate is not 'rested' at all, though the opinion of the majority of growers is that a rest, however short, should be given annually. It was frequently noticed that an unusually robust plant would suddenly develop the characteristic 'variegation' and curl.

"A three-year-old plant was kindly examined by Mr. Chittenden at Wisley. He reports that there is no sign of damage by a specific organism. Decayed and softened portions of roots exist, but only on the older parts of the rhizome, and that the trouble had undoubtedly been aggravated by the presence of either thrips or one of the mites.

"The estate is situated on one of the highest portions of the island, and the soil is a moderately heavy clay loam. Inside the Smilax houses it was inclined to be wet, and coated with blue-green algae between the rows. In the opinion of practical growers it was sufficiently open around the plants. Analysis proved it to be decidedly rich, the figures being :—

Total Nitrogen	. .	·20
,, Phosphates	.	·569
,, Potash	. .	·24
,, Soda	. .	·85
,, Lime	. .	3·9 (as carbonate, about 2 per cent.)
,, Magnesia	. .	·08
,, Iron	. . .	7·6
Loss on ignition	. .	9·0 per cent.
Soluble salts	. .	·194

"Noteworthy points are the large amount of iron and calcium, both of which had been added in some quantity.

"It was thought by the appearance of the cell contents that possibly the richness of the soil might account for the trouble. Among many pot experiments, a spray fairly free from 'curl' and showing no variegation was obtained by withholding manure of all kinds, watering well at first and then keeping it dry. This treatment, however, gave no visible result when tried on a large scale.

"The effect was tried of using varying quantities of artificial and farmyard manure; of modifying the texture of the soil with ashes, sand, &c.; of the addition of charcoal, soot, iron, lime, and chalk; of planting affected seedlings in soil from these houses after sterilization by heat, toluene, and formalin; of transplanting affected plants into a sample of the same soil which had been previously well washed with hot water; but without throwing light on the cause of the trouble. A *healthy* seedling planted in well-washed soil from the affected houses, however, remained quite healthy and grew well, though repeated experiments show that when healthy plants are introduced into the untreated soil from the affected houses they at once begin to show the characteristic symptoms.

"It is worthy of note that a similar case in a greenhouse in another part of the island was treated by the owner in the following manner:—

"A moveable boiler was brought into the house, and the row thoroughly drenched with water as near the boiling point as possible. The plants died down, but recovered, and the new shoots showed no variegation or curl.

"None of the affected plants have been seeded down at present. Seed has always been obtained from the same place, and has previously given every satisfaction.

Suggestions have been made (1) that the trouble is due to 'defective root action,' resulting in insufficient chlorophyll formation; (2) that it is due to prolonged growth without a 'rest'; (3) that the appearance results from planting too deeply; (4) two experts to whom the owner has submitted specimens attribute the trouble to 'eelworm'—others can find no trace of insect or fungoid trouble.

"With regard to No. 2, the owner has previously grown Smilax quite satisfactorily without a 'rest,' and does not agree that this is the cause."

Scientific Committee, March 4, 1913.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair, and twelve members present.

Odontoglossum × *'Saturne.'*—M. H. Graire, of Amiens, showed this curious hybrid between *O. nebulosum* and *O. Harryanocrispum*. It closely resembles *O. nebulosum* in the form of the flowers, which are white, closely spotted with light brown and rose.

Odontonia × *'Cybele.'*—Messrs. Charlesworth & Co. showed this cross between *Odontoglossum cirrhosum* and *Miltonia candida grandiflora*. Mr. O'Brien, V.M.H., showed illustrations of both the parents, and called attention to the fact that the tubular labellum of *Miltonia, candida* did not appear in the slightest degree, the broadly ovate spathulate labellum of the hybrid being perfectly flat. The colouring of the petals and sepals (broad bands of brown) were from the *Miltonia*, but the apiculate reflexed tips of the segments were as in *Odontoglossum cirrhosum*. The dark red lines characteristic of *cirrhosum* also appeared at the base of the labellum. A Certificate of Appreciation was awarded to Messrs. Charlesworth.

Narcissus triandrus albus × *N. cyclamineus*.—Mr. Chapman, of Rye, showed this pretty hybrid, in which the cup was slightly paler than the perianth. It had a straight corona slightly cut at the mouth, while the perianth was reflexed. It flowered four years after the seed was sown, and Mr. Chapman's experience was that four or five years practically always elapsed between seed-sowing and flowering in these miniature Narcissi.

Hippeastrum "runners."—Mr. Worsley showed two small bulbs of a garden *Hippeastrum* which had developed at the ends of short stolons bearing nodes and roots. Similar growths are normal in Montbretias, and occasionally occur in Snowdrops and Leucojums.

Variation in seedlings.—Mr. Wilson, F.L.S., showed flowers of two Orchid hybrids from the same seed-pod. They were totally different in colour, one being of a brick-red, the other white with a few red spots.

Epiphytic Cyrtanthus.—Mr. Ledger showed some bulbs of a new species of *Cyrtanthus* called *C. dendrophilus*, from its being found wild on trunks of trees, such as species of *Podocarpus*. Mr. Medley Wood wrote that it rooted among the moss on the trunks on which it grew.

Chionoscillas.—Mrs. Backhouse sent various Chionoscillas with the original parents, *Chionodoxa sardensis* and *Scilla bifolia*, for comparison. The first generation showed no white in the filaments such as the *Chionodoxa* shows, while they were midway in breadth between the two parents. The perianth colour contained just a suggestion of violet in the blue, giving it a different tone from that of the *Chionodoxa*. The perianth pieces were about equally broad with those of *Chionodoxa*. The seedlings from these varied a good deal in shade, some being quite blue, others purplish-blue, and occasionally one appeared with

white or whitish filaments, but these were usually coloured like the *Scilla*. The flowers in the second generation were mostly broad petalled.

Narcissus with frilled trumpet.—Mr. Bowles showed flowers of a white Narcissus with a frilled corona, and remarked that when the plants were newly divided the frill was, as a rule, not developed until two or three seasons of growth had been passed and the plants had become established.

SCIENTIFIC COMMITTEE, MARCH 18, 1913.

Mr. C. E. SHEA, F.R.H.S., in the Chair, and five members present.

Dahlia plants failing.—Mr. Massee, V.M.H., reported that the Dahlias sent from Edinburgh in which the buds had failed to start were attacked by the fungus *Sclerotinia sclerotiorum.*

Lathyrus sativus (*poisonous*).—Mr. Holmes, F.L.S., showed seeds of *Lathyrus sativus* and those of *Pisum sativum* and *P. arvense* from India for comparison, in order to draw attention to the fact that seeds of the first-named plant were being sold (under the name of Mutti) for cattle food instead of the latter. They were imported from India and were now to be obtained in various markets. The seeds of *L. sativus* are poisonous, though the symptoms of poisoning do not always manifest themselves very quickly and the actual poisonous substance has not been isolated.

Holly growing on shingle beach.—A correspondent sent a photograph of a fine Holly growing on a shingle beach at Lydd, Kent, where also several other unusual plants are to be found growing wild. The bush is a large one and fruited well in the past year.

Alleged poisoning by Ferns.—Miss S. Edmonds sent an account of the death of two cats, supposed to have been caused by eating the fronds of Ferns in a dwelling-house. One had died, and a second, which later betrayed the same symptoms, which were those of an irritant poison, was killed, as recovery was deemed impossible. The first was not examined, but the second was, and pieces of a Fern frond were found in the stomach. The Fern was sent for examination and proved to be *Nephrolepis exaltata* var. *todeaoides.* No record of this Fern or any of its congeners being poisonous was known to any member of the Committee, but the Committee would be glad to learn whether animals having access to it have been known to be poisoned. The evidence in the present case seems far from conclusive, but as cats very frequently nibble Ferns, and this Nephrolepis is very widely cultivated, other cases may come to light.

SCIENTIFIC COMMITTEE, APRIL 1, 1913.

Mr. G. GORDON, V.M.H., in the Chair, and five members present.

Fasciated Stock.—Mr. H. Stuart Thompson sent from the South of France part of a fasciated example of *Matthiola sinuata* bearing hundreds of flowers and having a stem about 2¾ inches in width.

Though fasciated plants are very frequently shown before the Committee, perhaps more frequently than those showing any other aberration of growth, Stocks have rarely or never been exhibited in this condition. The present specimen was growing on the cliff outside an hotel garden, and others there showed a similar habit of growth.

Locusts and Coconuts.—Mr. Gilliat sent a note concerning the destruction of seedling coconuts over an area of 500 acres in the Federated Malay States, where the trouble from this pest has recurred in a second year. The use of paraffin had proved unsuccessful in abating the trouble, and it was suggested that Paris green or lead arseniate should be tried, either as a spray or by drenching some locusts, collected and slightly crushed beforehand, with this poison. Some species of locust are cannibals, and it might be possible to check their ravages by collecting and poisoning some of them in this way.

Malformation in double Primula.—Dr. J. MacWatt sent a curious flower from a double Primrose seedling; the calyx was much larger than usual, and had double the usual number of teeth. It surrounded two separate and distinct double corollas, separately inserted on the receptacle and normal in every other respect.

SCIENTIFIC COMMITTEE, APRIL 15, 1913.

Mr. G. GORDON, V.M.H., in the Chair, and six members present.

Hose-in-Hose Polyanthus.—Mrs. Berkeley, of Spetchley Park, Worcester, sent Polyanthuses of the hose-in-hose type in which the calyx segments are exactly similar to those of the corolla.

Delayed Flowering of Amaryllis Belladonna.—Mr. Odell referred to the failure of *Amaryllis Belladonna* to produce flowers in the past autumn, and stated that the aborted flowers were now being developed. Mr. Worsley stated that the same thing had happened in his garden after wet summers. It may be noted that *A. Belladonna* flowers in January at the Cape just after the leaves begin to go off. It may occasionally flower a second time in June.

Odontioda × *Patricia.*—Mr. Rolfe, A.L.S., exhibited paintings and flowers of five seedlings obtained by Messrs. Charlesworth from *Odontioda Charlesworthii* (*Cochlioda Noezliana* × *Odontoglossum Harryanum*) crossed by *Odontoglossum* × 'Phœbe' (*O. cirrhosum* × *O. crispum*), and showing a remarkable range of colour variation from the same capsule. Two were of a peculiar shade of dark claret-red, and another brilliant orange-brown, these being self-coloured except for a little yellow on the lip. A fourth was yellow with large transverse red blotches, and a fifth claret-purple with a darker mottling. The differences in shape were not great except in the lip, the fourth being most like the *Odontioda* parent, and the others more deltoid, as in the *Odontoglossum*. Flowers of both parents were also shown.

Epidendrum × *kewense.*—Mr. Rolfe also showed a series of paintings of *E.* × *kewense* with its parents and offspring. The bright yellow *E. xanthinum* crossed with the deep purple *E. evectum* gave the salmon-

coloured *E.* × *kewense*. The latter re-crossed with the original purple species gave purple hybrids with a yellow crest (not a purple crest as in *E. evectum*), but re-crossed with the yellow species gave flowers of a reddish-salmon colour, one, however, being more orange-coloured. When *E.* × *kewense* was self-fertilized the offspring showed a gradation between the deep yellow of *E. xanthinum* through various shades of salmon to cerise and light rosy purple. The two extremes were primrose yellow (much lighter than *E. xanthinum*) and clear purple with a white crest touched with yellow in the centre.

Wasps active in winter.—The Rev. Canon Fowler remarked that near Reading a wasps' nest had been found on December 31, 1912, in a quite active state.

Scientific Committee, April 29, 1913.

Mr. A. W. Hill, M.A., in the Chair, and five members present, with Sir Arthur Hort, visitor.

Scilla campanulata.—Mr. A. Worsley showed flowers of a Scilla approaching *S. campanulata* in form, to draw attention to the colour of seedlings of the pink form of that species which appeared in his garden after the introduction of some white ones among the blue. About one-third of the seedlings produced white flowers, rather less than one-third pink or purplish-pink, and rather over one-third blue flowers. It was not stated whether the flowers were self-pollinated or whether promiscuous crossing had occurred.

Effect of frost on Narcissus.—Mr. J. T. Bennett-Poë exhibited a flower of Narcissus 'Green-Eye,' to show the influence of frost, which had caused the perianth pieces to remain undeveloped, and to wither partially, while the corona remained unaffected.

Narcissus: Variation in Wild Forms.—Sir Arthur Hort showed a number of forms of Daffodils gathered in the Pyrenees, exhibiting remarkable variation in colour and size. They mostly occurred in rich pastures, and among them were bi-coloured and self-coloured forms, as well as considerable variety in the breadth of the perianth segments, and in the form and shape of the corona.

Anthurium × *conchiflorum.*—A hybrid Anthurium, bearing the name of *A.* × *conchiflorum*, was shown from the garden of Sir Trevor Lawrence, Bart. It was raised by Mr. Bain by crossing *A. Chamberlainianum* with *A. Scherzerianum*. The leaves were long-stalked, with blade (about 14 inches by 6 inches) cordate at the base and acuminate; the inflorescence differed markedly from that of *A. Scherzerianum* in the breadth of the scarlet spathe, which in some instances measured 4½ inches in diameter by nearly the same in length, and in the curious hooding at the somewhat cordate base of the spathe. The spathe was glossy outside and dull within.

Polyanthus and Daisy abnormal.—Mr. T. H. Dipnall sent an inflorescence of a Polyanthus with a second umbel superposed upon the first, and a Daisy without ray florets.

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 7, 1913.

Mr. G. BUNYARD, V.M.H., in the Chair, and fourteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for Apples.

Silver Knightian Medal.

To Mr. W. E. Sands, Hillsborough, for Potatos.
To Messrs. Seabrook, Chelmsford, for Apples and Pears.
To Messrs. Sutton, Reading, for vegetables and salads.

Silver Banksian Medal.

To Mrs. Denison (gr. Mr. Gentle), Little Gaddesden, for Carrots.

Cultural Commendation.

To Mr. A. G. Gentle (gr. to Mrs. Denison), Little Gaddesden, for Carrots.

Other Exhibits :—

Colonel Lockwood (gr. Mr. Cradduck), Romford : Apples.
A. W. Sutton, Esq. (gr. Mr. Nye), Woolhampton : Apples.
Messrs. Westmacott, London : South African produce.

FRUIT AND VEGETABLE COMMITTEE, JANUARY 21, 1913.

Mr. J. CHEAL in the Chair, and fifteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. Rivers, Sawbridgeworth, for Oranges.

Silver-gilt Knightian Medal.

To Messrs. Cheal, Crawley, for Apples and Pears.

Silver Banksian Medal.

To Sir Walter Gilbey, Elsenham, for preserved fruits, jams, etc.
To Messrs. Sutton, Reading, for vegetables.

Other Exhibits.

Messrs. Carter, Raynes Park : Savoy 'Cartercone.'

Mr. W. N. Hutt, State Horticulturist, Raleigh, North Carolina, U.S.A., sent six varieties of pecan nuts as follows :—

Curtis.—An early bearing variety of the highest quality having a very thin-shelled nut, which is pointed at both ends and has a good flavour

Frotscher.—This variety is described as large, handsome, hardy and productive. The nut is pointed at one end and rounded at the other, and has an excellent rich flavour.

Schley.—An excellent variety.

Stuart.—A most widely planted variety, large, hardy, and very productive. The nuts are conical in shape and of good flavour.

Success.—This is a large, handsome, and productive variety. The nuts are similar in shape to those of the variety 'Stuart.' The flavour is excellent.

Van Deman.—A standard variety, attractive on account of its large size. The nuts are very long and pointed, and have a good flavour.

The pecan is now being extensively planted in the Southern United States for commercial nut production. Some varieties of pecans have been analysed and were found to yield from 75 to 80 per cent. of oil.

Colonel Lockwood, London: Apples.

Mrs. Miller, Marlow: preserves.

Messrs. Westmacott, London: Cape fruit.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 4, 1913.

Mr. J. CHEAL in the Chair, and sixteen members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Carter, Raynes Park, for Potatos.

Silver Knightian Medal.

To Messrs. Seabrook, Chelmsford, for Apples.

To Messrs. Sutton, Reading, for vegetables.

Other Exhibits.

Messrs. Barr, Taplow: ornamental Kale.

Messrs. Brown, Peterborough: Apple 'Wadlow's Seedling.'

Sir W. Gilbey, Elsenham: jams, preserved fruits, &c.

Mrs. Miller, Marlow: Moyleen confections.

Messrs. Westmacott, London: South African produce.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 18, 1913.

Mr. G. BUNYARD, V.M.H., in the Chair, and eleven members present.

Awards Recommended:—

Silver Knightian Medal.

To Mrs. Denison (gr. Mr. Gentle), Berkhamsted, for roots and tubers.

Silver Banksian Medal.

To Sir Walter Gilbey, Elsenham, for Lavender Water, &c.

To Messrs. Sutton, Reading, for Broccoli.

FIG. 103.—APPLE 'ARTHUR TURNER.' (p. l.)

[*To face p.* xlviii.

FIG. 104.—LINDENBERGIA GRANDIFLORA. (*Gard. Chron.*) (p. li.)

Other Exhibits.

Mrs. Miller, Marlow: 'Moyleen' confections.
R.H.S. Gardens, Wisley: Rhubarb.
Miss Sewell, Kensington: marmalade, &c.
Messrs. Westmacott, London: South African Pineapples.

FRUIT AND VEGETABLE COMMITTEE, MARCH 4, 1913.

Mr. J. CHEAL in the Chair, and thirteen members present.

Award Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Sutton, Reading, for salads.

FRUIT AND VEGETABLE COMMITTEE, MARCH 18, 1913.

Mr. J. CHEAL in the Chair, and eighteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Sutton, Reading, for vegetables.

Silver-gilt Banksian Medal.

To Messrs. Westmacott, London, for South African fruit.

Other Exhibit.

G. H. Dawson, Esq., Newton Abbot: Apples.

FRUIT AND VEGETABLE COMMITTEE, APRIL 1, 1913.

Mr. J. CHEAL in the Chair, and ten members present.

No awards were recommended on this occasion.

Exhibits.

H. G. Gieuth, Esq., Newport, Salop: Apple for naming.
Messrs. Rutter, Wisbech: Apples.

FRUIT AND VEGETABLE COMMITTEE, APRIL 15, 1913.

Mr. J. CHEAL in the Chair, and seventeen members present.

Awards Recommended :—

Gold Medal.

To Messrs. Sutton, Reading, for vegetables.

Silver Banksian Medal.

To Lady Wernher (gr. Mr. Metcalfe), Luton, for 'Royal Sovereign' Strawberries.

Cultural Commendation.

To Mr. A. Metcalfe for forced Strawberries.

Other Exhibits.

Messrs. Cheal, Crawley: Apple 'Crawley Beauty.'
Duke of Rutland, Grantham: Apple 'St. George.'
Messrs. Westmacott, London: South African fruits.

FRUIT AND VEGETABLE COMMITTEE, APRIL 29, 1913.

Mr. A. H. PEARSON, J.P., V.M.H., in the Chair, and ten members present.

Award Recommended:

Silver-gilt Knightian Medal.

To Messrs. Carter, Raynes Park, for vegetables.

The Apple 'Arthur Turner' (Fig. 103) was shown on September 24, 1912, under the name 'Turner's Prolific,' when it received an Award of Merit. The name was subsequently changed to 'Arthur Turner' (see JOURNAL R.H.S. xxxviii., p. ccxl.).

FLORAL COMMITTEE.

JANUARY 7, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Mr. C. P. Raffill, Kew, for photographs.
To Messrs. Sutton, Reading, for Cyclamen.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.
To Messrs. May, Upper Edmonton, for Ferns.
To Messrs. J. Veitch, Chelsea, for greenhouse plants.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations and forced shrubs, &c.
To Mr. C. Engelmann, Saffron Walden, for Carnations.
To Messrs. Gill, Falmouth, for Rhododendrons, &c.
To Messrs. S. Low, Bush Hill Park, for Carnations.
To Messrs. W. Paul, Waltham Cross, for Camellias.
To Messrs. Piper, Barnes, for dwarf shrubs and Primulas.
To Mr. G. Reuthe, Keston, for hardy plants.
To Messrs. Whitelegg and Page, Chislehurst, for Primulas.

Bronze Flora Medal.

To Messrs. Cannell, Swanley, for Pelargoniums.

Award of Merit.

To *Lindenbergia grandiflora* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A tall shrubby greenhouse plant from the Himalayan region, bearing bright yellow Mimulus-like flowers in great abundance. The leaves are ovate and have a serrated margin. The plant shown had been in flower for three months, thus demonstrating its great value for decorative work in winter. (Fig. 104.)

Other Exhibits.

Messrs. Allwood, Haywards Heath : Carnations.
Messrs. Cheal, Crawley : rock garden.
Messrs. Clark, Dover : hardy plants.
Mr. C. Elliott, Stevenage : rock garden.
Messrs. Hammond, Brentwood : Chrysanthemum 'Apricot.'
Misses Hopkins, Shepperton : hardy plants.
Earl of Jersey (gr. Mr. Hawkes), Isleworth : Cyclamen.
D. MacMaster, Esq., K.C., M.P. (gr. Mr. Pigg), Virginia Water : Freesias.

Mr. W. H. Page, Hampton : Carnation 'Salmon Britannia.'

W. Parrott, Esq. (gr. Mr. Cox), Hungerford : Chrysanthemum 'Miss Annie Howard Parrott.'

Messrs. Peed, Norwood : hardy plants.

H. T. Pitt, Esq. (gr. Mr. Thurgood), London : *Agave filifera Leopoldii.*

Mr. L. R. Russell, Richmond : *Isoloma hirsutum*, and Azaleas.

Messrs. Ware, Feltham : hardy plants.

Messrs. Wells, Merstham : Carnations.

FLORAL COMMITTEE, JANUARY 21, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-seven members present.

Awards Recommended :—

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. Cutbush, Highgate, for Carnations, hardy plants, and forced shrubs.

To Messrs. May, Upper Edmonton, for epiphytal Ferns.

To Mr. M. Prichard, Christchurch, for alpines.

To Mr. L. R. Russell, Richmond, for hardy plants.

To Messrs. Sutton, Reading, for Cyclamen.

To Messrs. J. Veitch, Chelsea, for miscellaneous greenhouse plants.

Silver Banksian Medal.

To Mr. C. Elliott, Stevenage, for alpines.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

To Messrs. Gill, Falmouth, for Rhododendrons, &c.

To Messrs. S. Low, Bush Hill Park, for Carnations and Cyclamen.

To Mr. G. Reuthe, Keston, for hardy plants.

To Mr. T. Smith, Kingston Hill, for forced shrubs and bulbs.

To Messrs. Wallace, Colchester, for hardy plants.

To Messrs. Ware, Feltham, for alpines.

To Wargrave Plant Farm, London, for alpines.

Bronze Banksian Medal.

To Messrs. Clark, Dover, for Primroses, &c.

To Messrs. Piper, Bayswater, for hardy plants.

Award of Merit.

To *Cyclamen persicum giganteum* 'St. George' (votes, 18 for), from St. George's Nursery Co., Harlington. A large-flowered bright reddish-salmon variety with handsome foliage prettily edged with silver.

To *Narcissus minicycla* (votes, 13 for), from Mr. F. H. Chapman, Rye. A charming hybrid resulting from a cross between *N. cyclamineus* and *N. minimus*, the former being the seed-bearing parent.

It grows about 5 inches high and is intermediate in character between the parents. The tube is long and narrow, and the perianth segments are wider and less recurved than those of *N. cyclamineus*.

To Rose 'Mrs. Charles Russell' (votes, 15 for, 6 against), from Mr. W. A. Manda, St. Albans. A medium-sized H.T. of good substance. It is rose-pink in colour, tinged with purple, and is strongly scented. The flowers exhibited were cut in America and appeared to have been borne on very vigorous plants. (Fig. 105.)

Other Exhibits.

Messrs. Allwood, Haywards Heath: Carnations.
Messrs. Barr, Covent Garden: flowering bulbs, &c.
Mr. J. Box, Haywards Heath: hardy plants.
Messrs. Cannell, Swanley: Pelargoniums.
Sir Gilbert Greenall, Bart. (gr. Mr. Groves), Warrington: Chrysanthemum 'Lady Greenall.'
Misses Hopkins, Shepperton: hardy plants.
R. Hughes, Esq., Potters Par: paintings.
Miss E. S. Ough, Streatham Common: paintings.
Messrs. Peed, Mitcham: rockery.
Messrs. Wells, Merstham: Carnations.
Messrs. Whitelegg and Page, Chislehurst: hardy plants.
Miss Willmott, V.M.H., F.L.S. (gr. Mr. Fielder, V.M.H.), Great Warley: *Amygdalus warleyensis*, *Dombeya* (syn. *Astrapaea*) *Wallichii*.

FLORAL COMMITTEE, FEBRUARY 4, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended:—

Gold Medal.

To Messrs. Cuthbert, Southgate, for forced flowering shrubs.

Silver-gilt Flora Medal.

To Messrs. May, Upper Edmonton, for filmy Ferns.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.
To Messrs. Cutbush, Highgate, for forced shrubs and Carnations.
To Messrs. W. Paul, Waltham Cross, for Camellias.
To Mr. L. R. Russell, Richmond, for forced shrubs.
To Messrs. J. Veitch, Chelsea, for greenhouse plants.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Barr, Covent Garden, for rockery.
To Messrs. Cheal, Crawley, for rockery.

To Mr. C. Elliott, Stevenage, for rock plants.
To Mr. C. Engelmann, Saffron Walden, for Carnations.
To Messrs. S. Low, Enfield, for Carnations and Cyclamen
To Mr. J. MacDonald, Harpenden, for Grasses.
To Messrs. Piper, Bayswater, for rock plants.
To Mr. M. Prichard, Christchurch, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Flora Medal.

To Messrs. Clark, Dover, for hardy plants.
To Wargrave Plant Farm, London, for hardy plants.

First-class Certificate.

To *Polypodium irioides pendulum grandiceps* (votes, unanimous), from Messrs. H. B. May, Upper Edmonton. A very handsome intermediate greenhouse Fern from Queensland. It is a pendulous form of *P. irioides ramo-cristatum*, having long smooth branched fronds of a pleasing green colour and somewhat resembling *Platycerium* in form.

Award of Merit.

To *Crocus chrysanthus* 'E. A. Bowles' (votes, unanimous), from Messrs. Barr, Covent Garden. A very pretty light yellow Crocus with larger segments than those of the type. It is said to possess a wonderfully hardy constitution. It was raised in Holland by Mr. van Tubergen.

Other Exhibits.

Mr. J. Box, Haywards Heath : hardy plants.
Messrs. Cannell, Swanley : Cyclamen, Begonias, &c.
Mr. F. H. Chapman, Rye : *Cyclamen ibericum album.*
Mr. R. E. Gill, Falmouth : Rhododendrons.
Misses Hopkins, Shepperton : hardy plants.
R. Hughes, Esq., Potters Bar : pictures.
Mr. H. Kempshall, Dorchester : *Azara Gilliesii* (syn. *A. crassifolia*), *Pittosporum heterophyllum.*
Mr. W. A. Manda, St. Albans : Begonias, &c.
Messrs. Mount, Canterbury : Roses.
S. W. Node, Esq., Chislehurst : *Primula malacoides plena.*
Miss Ough, Streatham Common : paintings.
Messrs. Peed, Mitcham : hardy plants.
Messrs. Rogers, Southampton : Fuchsias.
Messrs. Sutton, Reading : Primulas.
Messrs. Thompson and Charman, Bushey : hardy plants.
Messrs. Wallace, Colchester : hardy plants.
Messrs. Ware, Feltham : hardy plants.
Messrs. Wells, Merstham : Carnations.
Messrs. Whitelegg and Page, Chislehurst : hardy plants.
Messrs. Young, Cheltenham : Carnations.

Floral Committee, February 18, 1913.

Mr. H. B. May, V.M.H., in the Chair, and thirty members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. J. Veitch, Chelsea, for Azaleas and miscellaneous greenhouse plants.

Silver-gilt Banksian Medal.

To Mr. H. Burnett, Guernsey, for Carnations.
To Messrs. Hill, Lower Edmonton, for Ferns.
To Messrs. May, Upper Edmonton, for Ferns.
To Messrs. Sutton, Reading, for Primulas.

Silver Flora Medal.

To Messrs. Barr, Covent Garden, for rockery and Daffodils.
To Mr. F. H. Chapman, Rye, for Daffodils.
To Messrs. Cutbush, Highgate, for forced shrubs, &c.

Silver Banksian Medal.

To Rev. H. Buckston (gr. Mr. A. Shambrook), Etwall, for Cyclamen.
To Messrs. Carter, Raynes Park, for Daffodils.
To Messrs. Cartwright and Goodwin, Kidderminster, for Daffodils.
To Mr. C. Elliott, Stevenage, for alpines.
To Mr. R. E. Gill, Falmouth, for Rhododendrons, &c.
To Messrs. S. Low, Bush Hill Park, for Carnations, &c.
To Messrs. W. Paul, Waltham Cross, for flowering shrubs.
To Mr. L. R. Russell, Richmond, for forced shrubs.
To Messrs. Whitelegg and Page, Chislehurst, for hardy plants.

Bronze Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Mr. G. Reuthe, Keston, for hardy plants.
To Messrs. Ware, Feltham, for rockery.

Bronze Banksian Medal.

To Messrs. Piper, Bayswater, for rockery.
To Mr. M. Prichard, Christchurch, for hardy plants.

Award of Merit.

To *Crocus* 'Kathleen Parlow' (votes, 16 for, 1 against), from Messrs. Cartwright and Goodwin, Kidderminster. A very large pure white variety.

Cultural Commendation.

To Mr. H. Kempshall, gr. to Mary, Countess of Ilchester, Abbotsbury, Dorchester, for *Magnolia Campbellii*. **F.C.C.** March 10, 1903.

Other Exhibits.

Miss Adie, Kensington : pictures.
Messrs. Barrie and Brown, London : lawn grass, &c.
Messrs. Bath, Wisbech : forced bulbs.
Messrs. Bees, Liverpool : alpines.
Mr. J. Box, Haywards Heath : hardy plants.
Messrs. Brooks, Basingstoke : Primulas.
Burton Hardy Plant Nurseries, Christchurch : hardy plants.
Messrs. Cannell, Swanley : Pelargoniums.
Messrs. Clark, Dover : alpines.
Miss di Guardi, Richmond Hill : pictures.
Mr. C. Engelmann, Saffron Walden : Carnations.
Mrs. Fisher, East Molesey : pictures.
Guildford Hardy Plant Nursery, Guildford : hardy plants.
Miss Gundry, Foots Cray : pictures.
Misses Hopkins, Shepperton : hardy plants.
Mr. H. Howes, London : Cinerarias.
R. Hughes, Esq., Potters Bar : pictures.
Mrs. MacAlister, London : pictures.
Miss Mason, London : pictures.
Miss Massee, Kew : pictures.
Mr. G. W. Miller, Wisbech : hardy plants.
Messrs. Mount, Canterbury : Roses.
Miss Ough, Streatham Common : pictures.
Messrs. Peed, Mitcham : hardy plants.
Mr. J. Sale, Brickendonbury : *Veltheimia viridifolia variegata.*
Messrs. Thompson and Charman, Bushey : alpines.
Messrs. Tucker, Oxford : alpines.
Messrs. Wallace, Colchester : hardy plants.
Wargrave Plant Farm, London : hardy plants.
Miss Warrington, Streatham Common : pictures.
Messrs. Wells, Merstham : Carnations.
Messrs. Young, Cheltenham : Carnations.

FLORAL COMMITTEE, MARCH 4, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-eight members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Carter, Raynes Park, for Spring garden.

To Sir Everard A. Hambro, K.C.V.O. (gr. Mr. Grandfield), Hayes, for hardy plants.

Silver-gilt Banksian Medal.

To Messrs. Piper, Bayswater, for hardy plants and Hyacinths.

To Messrs. Veitch, Chelsea, for Cinerarias and forced shrubs.

FIG. 105.—H.T. ROSE ' MRS. CHARLES RUSSELL.' *(Garden.)* (p. liii.)

[*To face p.* lvi.

Fig. 106.—Mazus rugosus. (*Gard. Chron.*) (p. lvii.)

Fig. 107.—Saxifraga × 'Faldenside.'

FIG. 108.—OMPHALODES CORNIFOLIA. (*Gard. Chron.*) (p. lix.)

[*To face p.* lvii

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for forced shrubs and Tulips.
To Mr. C. Elliott, Stevenage, for rockery.
To Messrs. Sutton, Reading, for Hyacinths, &c.
To Messrs. Wallace, Colchester, for rockery.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Mrs. Balfour, Oxford, for Hyacinths.
To Mr. J. Box, Haywards Heath, for rockery.
To Mr. H. Burnett, Guernsey, for Carnations.
To Messrs. Jackman, Woking, for hardy plants.
To Messrs. Low, Bush Hill Park, for Carnations and Acacias, &c.
To Messrs. May, Upper Edmonton, for Ferns and flowering plants.

Bronze Flora Medal.

To Messrs. Blackmore and Langdon, Bath, for Violets.
To Messrs. Cheal, Crawley, for rockery.
To Mr. C. Engelmann, Saffron Walden, for Carnations.
To Messrs. Carter Page, London Wall, for bulbs in bowls.
To Mr. M. Prichard, Christchurch, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Banksian Medal.

To Mr. R. d'E. Day, Sutton Scotney, for Spanish Iris.

Award of Merit.

To *Mazus rugosus* (votes, unanimous), from the Wargrave Plant Farm, Ltd., London, E.C. This charming plant is one of the most distinct early alpines. It is said to be quite hardy, and is of creeping habit, growing 1 inch high. The leaves are sessile and measure about $\frac{1}{2}$ inch long. The flowers are large in proportion to the size of the plant, and have a short notched upper lip and a large lower lip with three lobes, the two outer ones of which are white with brown spots, while the other parts of the flower are violet-mauve. (Fig. 106.)

To *Saxifraga* × 'Faldonside' (votes, unanimous), from Sir Everard Hambro, K.C.V.O. (gr. Mr. Grandfield), Hayes Place, Hayes. A charming garden hybrid Saxifrage of great beauty. The flowers are large and of a pale lemon-yellow colour, and measure $\frac{3}{4}$ inch across. They are abundantly borne in twos or threes on short stems arising from tufts of leaves which are larger and bolder than those of *S. Boydii*. The petals are prettily crimped at the edges. (Fig. 107.)

To *Syringa vulgaris* 'Hugo Koster' (votes, unanimous), from Messrs. M. Koster, Boskoop, Holland. A very free-flowering Lilac bearing large dense trusses of lilac-mauve flowers. The individual flowers are of large size. This variety was raised as the result of cross-hybridizing seedlings, and it is said to force earlier than the well-known variety 'Marie Legraye.'

Other Exhibits.

Messrs. Baker, Wolverhampton : hardy plants.
Messrs. Barr, Covent Garden : rockery.
Messrs. Brooks, Basingstoke : Primula 'The King.'
Burton Hardy Plant Nurseries, Christchurch : hardy plants.
Messrs. Cannell, Swanley : Cinerarias.
Messrs. Clark, Dover : alpines.
Messrs. Cuthbert, Southgate : Hyacinths.
Captain A. A. Dorrien-Smith, D.S.O., Berkhamstead : *Pimelea microcephala.*
Messrs. Fells, Hitchin : dwarf Conifers, &c.
Hon. Vicary Gibbs, Elstree : Hyacinths.
Mr. H. Hemsley, Crawley : alpines.
Misses Hopkins, Shepperton : hardy plants.
Mr. W. A. Manda, St. Albans : Begonias.
A. F. R. Dixon Nuttall, Esq., J.P., Prescot : Hyacinths.
Messrs. Peed, Mitcham : rockery.
C. Coltman Rogers, Esq., Brampton Bryan : *Crataegus Pyracantha crenulata.*
Mr. L. R. Russell, Richmond : hardy plants.
Mr. A. Shakelton, Chard : *Eupatorium petiolare.*
Messrs. Ware, Feltham : rockery.
Messrs. Whitelegg and Page, Chislehurst : rockery.
Messrs. Young, Cheltenham : Carnations.

FLORAL COMMITTEE, MARCH 18, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. J. Veitch, Chelsea, for Cinerarias and flowering shrubs.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.
To Messrs. Cannell, Swanley, for Zonal Pelargoniums.
To Messrs. Carter, Raynes Park, for a Spring garden.
To Messrs. Cutbush, Highgate, for Carnations and flowering shrubs.
To Mr. G. Prince, Longworth, for Roses.
To Mr. L. R. Russell, Richmond, for Clematis.
To Messrs. Wills and Segar, South Kensington, for flowering plants.

Silver Banksian Medal.

To Mr. J. Box, Haywards Heath, for rockery.
To Mr. R. d'E. Day, Sutton Scotney, for Spanish Iris.
To Mr. C. Elliott, Stevenage, for alpines.

To Messrs. Gill, Falmouth, for Rhododendrons, &c.
To Messrs. S. Low, Bush Hill Park, for Carnations, &c.
To Messrs. May, Upper Edmonton, for Clematis.
To Messrs. Piper, Bayswater, for rockery and flowering shrubs.
To Mr. M. Prichard, Christchurch, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.
To Messrs. Sutton, Reading, for Grasses.
To Wargrave Plant Farm, London, for hardy plants.

Bronze Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Mr. C. Engelmann, Saffron Walden, for Carnations.
To Messrs. Jackman, Woking, for hardy plants.
To Mr. A. Perry, Enfield, for Tree Paeonies.
To Messrs. Reamsbottom, Geashill, for Anemones.
To Messrs. Young, Cheltenham, for Carnations.

First-class Certificate.

To *Primula Purdomi* (votes, 17 for), from Messrs. J. Veitch, Chelsea. This is a distinct and charming addition to the genus. It was found at Tow-chow, West Kansu, China, at an altitude of 10,000 to 11,000 feet. The flowers, which are very fragrant, are a light shade of bright violet in colour and are borne in umbels of three to twelve on stems averaging 7 inches high. They are about 1 inch in diameter and have a small greenish-yellow eye and smooth-edged petals. The leaves are lanceolate, measuring 6 inches long by ¾ inch broad. The stems, calyces, and foliage are covered with white farina. (Fig. 68.)

Award of Merit.

To *Omphalodes Cornifolia (cappodocica)* (votes, 21 for), from Mr. M. Prichard, Christchurch. A very pretty dwarf variety which is said to be hardy. The flowers are of a beautiful sky-blue colour with a small white eye. They measure ½ in. across, and are borne very freely in loose cymes 6 to 8 inches from the ground. The leaves are ovate-lanceolate in shape. (Fig. 108.)

Other Exhibits.

Messrs. Barr, Taplow: rockery.
Messrs. Blackmore and Langdon, Bath: Violets and Polyanthus.
Messrs. Bunyard, Maidstone: alpines.
Burton Hardy Plant Nursery, Christchurch: alpines.
Messrs. Cheal, Crawley: rockery.
Messrs. Clark, Dover: alpines, &c.
Mr. A. F. Dutton, Iver: Carnations.
Guildford Hardy Plant Nursery, Guildford: hardy plants.
Mr. H. Hemsley, Crawley: alpines.
Misses Hopkins, Shepperton: alpines.
Messrs. Jarman, Chard: Geraniums and Cinerarias.
Mr. G. W. Miller, Wisbech: hardy plants.

Messrs. W. Paul, Waltham Cross : Roses, &c.
Messrs. Peed, Mitcham : rockery.
Mr. W. Shepherd, Poulton-le-Fylde : Carnations.
Mr. R. Staward, Hertford : Violet 'Lady Couper.'
Messrs. Thompson and Charman, Bushey : alpines.
Messrs. Tucker, Oxford : rockery.
Messrs. Ware, Feltham : rockery.
Messrs. Wells, Merstham : Carnations.
Messrs. Whitelegg and Page, Chislehurst : rockery.
Miss Willmott, V.M.H., Great Warley : *Prunus glandulosa trichostyla.*
Hon. Frances Wolseley, Glynde : garden model.

FLORAL COMMITTEE, APRIL 1, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-six members present.

Awards Recommended :—

Gold Medal.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree, for a rockery.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.
To Messrs. Clark, Dover, for Polyanthus, &c.
To Messrs. Cutbush, Highgate, for Carnations and flowering shrubs.
To Mr. M. Prichard, Christchurch, for alpines.
To Mr. G. Prince, Longworth, for Roses.

Silver Banksian Medal.

To Mr. J. Box, Haywards Heath, for rockery.
To Messrs. Cannell, Swanley, for Pelargoniums.
To Messrs. S. Low, Bush Hill Park, for Acacias, &c.
To Messrs. May, Upper Edmonton, for Ferns and Clematis.
To Messrs. G. Paul, Cheshunt, for Lilacs.
To Messrs. Piper, Bayswater, for hardy plants.
To Messrs. J. Veitch, Chelsea, for Cyclamen.

Bronze Flora Medal.

To Messrs. Baker, Wolverhampton, for alpines.
To Mr. C. Elliott, Stevenage, for rockery.
To Messrs. Gill, Falmouth, for Rhododendrons.
To Mr. H. Hemsley, Crawley, for hardy plants.
To Messrs. Jackman, Woking, for hardy plants.
To Messrs. W. Paul, Waltham Cross, for Roses.

Award of Merit.

To Carnation 'Mrs. Wilfred Gott' (votes, unanimous), from Messrs. Cutbush, Highgate. This excellent variety is the result of a cross between a Malmaison and a Perpetual-flowering variety. The flowers are large, pure white, and beautifully scented. In the foliage and calyx the plant resembles the Malmaison type, but it has the Perpetual-flowering habit. (Fig. 109.)

To *Douglasia laevigata* (votes, 18 for), from Mr. R. Prichard, West Moors, Dorset. A charming dense-growing alpine from the Alps of Oregon. The flowers are about $\frac{1}{3}$ inch in diameter and rose-pink in colour. They are borne abundantly on erect peduncles about 1 inch long. The leaves are $\frac{1}{2}$ to $\frac{3}{4}$ inch long and linear or oblong-lanceolate in shape. (Fig. 110.)

To *Primula* 'Jean Douglas' (votes, unanimous), from Mr. J. Douglas, Great Bookham. This charming plant is the result of a cross between *P. viscosa* and an Auricula. The flowers are purplish-rose with a small white eye. They are about 1 inch across and are borne in trusses of twelve to twenty. (Fig. 111.)

To *Primula viscosa* 'Othello' (votes, 17 for, 2 against), from Mr. J. Douglas, Great Bookham. A deep magenta-purple variety of vigorous habit.

Other Exhibits.

Messrs. Allwood, Haywards Heath: Carnations.
Messrs. Barr, Taplow: rockery.
Messrs. Barrie and Brown, London: lawn grass and alpines.
Miss Dixon, Edenbridge: Carnations, Polyanthus, and Violets.
Guildford Hardy Plant Nursery, Guildford: hardy plants.
Misses Hopkins, Shepperton: rockery.
Mr. T. Kitley, Bath: *Saxifraga decipiens bristoliana.*
C. P. Maw, Esq., Kenley: *Chionodoxa Luciliae alba.*
Messrs. Peed, Mitcham: rockery.
Messrs. Reamsbottom, Geashill: Anemones.
Mr. G. Reuthe, Keston: hardy plants.
Mr. L. R. Russell, Richmond: hardy shrubs, &c.
Mr. C. G. van Tubergén, Jr., Haarlem: *Freesia Tubergenii* 'Conquest.'
Messrs. Ware, Feltham: rockery.
Wargrave Plant Farm, London: rockery.
Messrs. Wells, Merstham: Carnations.
Messrs. Whitelegg and Page, Chislehurst: rockery.
Miss Willmott, F.L.S., Great Warley: *Primula spectabilis*, Warley var., *Draba brunoniaefolia incana*, and *Androsace Halleri.*
Messrs. Wills and Segar, Kensington: Gerberas, &c.

FLORAL COMMITTEE, APRIL 15, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. J. Veitch, Chelsea, for Primulas, Azaleas, &c.

Silver Flora Medal.

To Mrs. Berkeley, Spetchley, for Primroses.
To Mr. H. Burnett, Guernsey, for Carnations.
To Messrs. B. R. Cant, Colchester, for Roses.
To Mr. M. Prichard, Christchurch, for hardy plants.

Silver Banksian Medal.

To Mr. J. Box, Lindfield, or hardy plants.
To Messrs. Cannell, Swanley, for Pelargoniums.
To Messrs. Cutbush, Highgate, for Roses and Carnations.
To Mr. J. Douglas, Great Bookham, for Auriculas.
To Messrs. May, Upper Edmonton, for Ferns and flowering plants.
To Mr. G. Prince, Longworth, for Roses.
To St. George's Nursery, Harlington, for Calceolarias.
To Messrs. Sutton, Reading, for Cinerarias.

Bronze Flora Medal.

To Messrs. Ware, Feltham, for rockery.

Bronze Banksian Medal.

To Messrs. Barr, Taplow, for rockery.
To Messrs. Clark, Dover, for hardy plants.
To Mr. R. d'E. Day, Sutton Scotney, for Spanish Iris.
To Messrs. Gill, Falmouth, for Rhododendrons.
To Messrs. S. Low, Bush Hill Park, for greenhouse plants.
To Messrs. W. Paul, Waltham Cross, for Roses.
To Messrs. Phillips and Taylor, Bracknell, for Auriculas.
To Messrs. Reamsbottom, Geashill, for Anemones.
To Mr. G. Reuthe, Keston, for hardy plants.
To Mr. L. R. Russell, Richmond, for Clematis.
To Wargrave Plant Farm, London, for rockery.

Award of Merit.

To *Androsace tibeticum* (votes, 15 for), from Messrs. J. Veitch, Chelsea. A beautiful alpine from North China. The flowers are rosy pink and white, and are borne in umbels of eight to twelve, rising 2 inches above the rosettes of leaves.

To Auricula 'Suffragette' (vote, 16 for), from Mr. J. Douglas, Great Bookham. A deep yellow variety slightly tinted with buff. The flowers are perfect in form, large, and have a well-defined paste.

To *Helichrysum bellidioides* (votes, unanimous), from Mr. H. Hemsley, Crawley. A very pretty hardy plant from New Zealand. The flowers are about ½ inch across, and have many rows of pure white ray florets and a small greenish-yellow disc. The habit is trailing, and the small leaves are ovate in shape. (Fig. 112.)

To Hippeastrum 'Eurasian' (votes, unanimous), from Messrs. J. Veitch, Chelsea. A bright carmine-crimson variety of good form and dwarf habit.

To *Primula Maximowiczii* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A remarkable novelty from North China. The flowers are of a dull-red colour and are borne in whorls on a stout and erect scape about 9 inches high, which arises from a rosette of lanceolate leaves. The individual flowers are pendent and have the segments of the corolla reflexed. The pedicels are about ½ inch long.

To *Primula viscosa* 'Beauty' (votes, 11 for, 5 against), from Mr. J. Douglas, Great Bookham. The flowers are 1¼ inch across, and are borne loosely in the truss. They are a pretty shade of bright violet-purple in colour and have a small white eye.

Other Exhibits.

Messrs. Allwood, Haywards Heath: Carnations.
Messrs. Baker, Codsall: alpines.
Mr. T. Barron, Swansea: H.T. Rose 'Swansea.'
Messrs. Bide, Farnham: Pelargoniums.
Messrs. Blackmore and Langdon, Bath: Polyanthus
Mr. E. C. Bowell, Cheltenham: alpines.
Burton Hardy Plant Nursery, Christchurch: Auricula 'Edith,' *Viola pedata bicolor.*
M. Léonie Chamier, Zosin, Russia: *Primula veris alba.*
Messrs. Cheal, Crawley: rockery.
Mr. J. Crook, Camberley: Polyanthus.
Edinburgh Botanic Garden: Primulas.
Mr. C. Elliott, Stevenage: alpines.
Misses Hopkins, Shepperton: hardy plants.
Messrs. Jackman, Woking: hardy plants.
Messrs. Jones, Lewisham: Pelargoniums.
Mr. T. Kitley, Bath: *Saxifraga bristoliana.*
The London Bottle Co., E.C.: glass flower-pot.
Mr. J. MacDonald, Harpenden: Grass.
Mr. G. W. Miller, Wisbech: hardy plants.
Messrs. Peed, Mitcham: rockery.
Messrs. Wallace, Colchester: rockery.
Messrs. Whitelegg and Page, Chislehurst: alpines.
Miss Willmott, F.L.S., Great Warley: *Draba acaulis*
Messrs. Wills and Segar, Onslow Square: Mignonette, &c.

FLORAL COMMITTEE, APRIL 29, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Hobbies, Dereham, for Roses.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.
To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. Carter, Raynes Park, for Spring Garden.
To Messrs. Cutbush, Highgate, for Roses and Carnations.
To Messrs. Piper, Bayswater, for Azaleas and rockery.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Cheal, Crawley, for trees and shrubs.
To Messrs. Dobbie, Edinburgh, for Calceolarias and Violas.
To Messrs. Jones, Lewisham, for Pelargoniums.
To Messrs. Ker, Liverpool, for Hippeastrums.
To Messrs. May, Upper Edmonton, for flowering plants.
To Messrs. Carter Page, London Wall, for Violas and annuals.
To Messrs. Phillips and Taylor, Bracknell, for Auriculas.
To Mr. M. Prichard, Christchurch, for hardy plants.
To Messrs. Reamsbottom, Geashill, for Anemones.
To Mr. L. R. Russell, Richmond, for flowering plants.
To Messrs. J. Veitch, Chelsea, for flowering plants.
To Messrs. Ware, Feltham, for rockery.
To Messrs. Wills and Segar, Onslow Square, for Mignonette, &c.

Bronze Flora Medal.

To Mr. J. Box, Haywards Heath, for rockery.
To Messrs. S. Low, Bush Hill Park, for greenhouse plants.
To Messrs. Wells, Merstham, for Carnations.

Bronze Banksian Medal.

To Mrs. Lloyd Edwards, Llangollen, for Saxifrages.
To Mr. C. Elliott, Stevenage, for rockery.
To Mr. P. Ladds, Swanley, for flowering plants.

Award of Merit.

To *Aethionema armenum* 'Warley Hybrid' (votes, unanimous), from Miss Willmott, V.M.H., Warley Place, Great Warley. A charming sub-shrubby alpine growing about 6 inches high, and bearing crowded terminal racemes of rose-pink flowers in great profusion. This variety is more erect and has greater vigour than the type, and is also much earlier in flowering.

To *Cheiranthus Cheiri* 'Primrose Monarch' (votes, 15 for, 2 against), from Mr. J. W. Moss, Kelvedon. This Wallflower is a great

FIG. 109.—CARNATION 'MRS. WILFRID GOTT.' (*Garden.*) (p. lxi.)

[*To face p.* lxiv.

FIG. 110.—DOUGLASIA LAEVIGATA. (*Gard. Chron.*) (p. lxi.)

advance on already existing yellow varieties. It bears large flowers, often measuring 2 inches across. The colour is lemon yellow fading to sulphur yellow. The buds are dark and the plant has a dwarf growing and early flowering habit.

To Primula × 'La Lorraine' (votes, 16 for), from Mr. M. Prichard, Christchurch. This interesting and beautiful plant is a good intermediate hybrid between *P. cortusoides amoena* and *P. Veitchii*. It has the woolly foliage of the latter, and the large flowers of the former. The plant exhibited had five spikes of purplish rose flowers, each measuring 1½ inch across and having a small yellow eye. It is thought that it will prove to be hardy.

To Rose 'Erna Teschendorff' (votes, unanimous), from Mr. W. Profittlich, Twickenham. A dwarf Polyantha variety having crimson flowers, measuring 1¼ inches across. It is very free flowering, and is a sport from 'Mme. N. Levavasseur,' which it resembles in foliage and habit. It was raised by Mr. Teschendorff of Dresden.

Other Exhibits :—

Messrs. Baker, Wolverhampton : alpines.
Messrs. Barr, Taplow : rockery.
Messrs. Bunyard, Maidstone : hardy plants.
Burton Hardy Plant Nurseries, Christchurch : hardy plants.
Messrs. Cannell, Swanley : Pelargoniums.
Messrs. Clark, Dover : alpines.
Mr. L. Drage, Bishop's Stortford : double Wallflower.
Messrs. Fells, Hitchin : alpines.
Mr. D. W. Freshfield, Forest Row : *Saxifraga Fieldii*.
Mr. F. G. Gerrish, Tring : Carnation 'Mrs. P. Densham.'
Messrs. Gill, Falmouth : Rhododendrons.
N. Gossage, Esq., Guildford : Carnation.
Guildford Hardy Plant Nursery : hardy plants.
Mr. H. Hemsley, Crawley : alpines.
Mr. E. J. Hicks, Twyford : Roses.
Misses Hopkins, Shepperton : alpines.
Messrs. Jackman, Woking : alpines.
Mr. W. B. Kettle, Watford : *Clematis montana coerulea*.
P. D. W. Kiame, Esq., St. Keverne : double white Primrose.
Sir Trevor Lawrence, Bt., Dorking : *Anthurium* × *conchiflorum*.
E. J. P. Magor, Esq., St. Tudy : Rhododendron 'Gilian.'
Mr. G. W. Miller, Wisbech : hardy plants.
Messrs. Peed, Mitcham : alpines.
Mr. G. Reuthe, Keston : alpines and flowering shrubs.
Mr. A. Tatham, Nottingham : Carnation 'Sherwood.'
Messrs. Thompson and Charman, Bushey : alpines.
Messrs. Tucker, Oxford : alpines.
Wargrave Plant Farm, London : hardy plants.
Messrs. Whitelegg and Page, Chislehurst : alpines.

ORCHID COMMITTEE.

JANUARY 7, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-five members present.

Awards Recommended :—

Gold Medal.

To G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Page), for a fine group of Cypripediums in which were 250 specimens.

Silver-gilt Flora Medal.

To Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill), for finely flowered varieties of *Laelia anceps*.

To Messrs. Charlesworth for rare hybrids.

Silver Flora Medal.

To H. S. Goodson, Esq., Putney (gr. Mr. G. E. Day), for Odontoglossums, &c.

Silver Banksian Medal.

To Messrs. Jas. Veitch, Chelsea, for hybrid Cypripediums.

To Messrs. Sander, for rare species and hybrids.

To E. H. Davidson, Esq., Twyford, for a group.

To Messrs. Stuart Low, Enfield, for a group, principally showy species.

To H. T. Pitt, Esq., Roslyn, Stamford Hill, for Cypripediums, &c.

To Messrs. Cypher, Cheltenham, for Cypripediums and Calanthes.

To Messrs. McBean, Cooksbridge, for a group.

First-class Certificate.

To *Odontoglossum Pescatorei Sanderae* (votes, unanimous), from Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill). Flowers white with sepia-brown blotches. (Fig. 113.)

Award of Merit.

To *Odontonia* × *Firminii* (*Miltonia vexillaria* × *Odontoglossum crispum*) (votes, 17 for, 1 against), from Monsieur Firmin Lambeau, Brussels. Flowers white with a brownish-rose mask on the lip. In size and shape resembling *Miltonia Roezlii*. The cross was reported from Messrs. Linden's in 1903.

To *Habenaria Roebelenii* (votes, 13 for, 1 against), from E. H. Davidson, Esq. A showy new species of vermilion colour, the lip being one inch across. It is allied to *H. militaris* and *H. rhodocheila*. Sent from Annam by Mr. Roebelen.

To *Laelia anceps Roeblingiana* (votes, unanimous), from C. G. Roebling, Esq., Trenton, New Jersey, U.S.A. A distinct flower with the petals veined with rose-purple.

To *Cypripedium* × 'Minnie' var. 'Amazon' (*Leeanum* 'Corona' × *nitens*) (votes, unanimous), from F. M. Ogilvie, Esq., Oxford (gr. Mr. Balmforth). A good flower with round dorsal sepal, green at the base and white above.

To *Cypripedium* × 'Iona' (*bellatulum* × *Fairrieanum*) (votes, unanimous), from His Grace the Duke of Marlborough, Blenheim Palace (gr. Mr. Hunter). Flower cream-white with branched lines of claret colour.

To *Cypripedium* × 'Alcinida' ('Alcibiades' × *insigne* 'Harefield Hall') (votes, 14 for, 3 against), from Messrs. Charlesworth. Dorsal sepal broad, with apple-green base, and some purple spotted lines. Petals and lip greenish yellow tinged with brown.

To *Odontoglossum* × 'George Day' (*crispum* × *Rossii rubescens*) (votes, 16 for, 2 against), from H. S. Goodson, Esq. (gr. Mr. G. E. Day). Flowers lilac, the sepals and petals closely spotted with claret-red.

To *Cycnoches Cooperi* (votes, unanimous), from Messrs. Sander, St. Albans. Allied to *C. pentadactylon* but with larger, unspotted flowers, which are sepia-brown veined with dark purple. Imported from Peru. The plant shown had two racemes of male flowers.

Other Exhibits.

Lieut.-Colonel Sir George L. Holford, K.C.V.O.: four new hybrids.
J. S. Moss, Esq.: Odontoglossums.
de B. Crawshay, Esq.: Odontoglossums.
The Lady Wernher: *Calanthe* × 'Vulcan.'
F. J. Hanbury, Esq.: Cypripediums.
W. R. Lee, Esq.: *Cypripedium* × 'Lady Dillon.'
Sir Jeremiah Colman, Bart.: *Odontioda* × *Bradshawiae violacea.*
Francis Wellesley, Esq.: Cypripediums.
The Hon. R. James: *Cypripedium* × 'Lady Evelyn James.'

ORCHID COMMITTEE, JANUARY 21, 1913.

Sir HARRY J. VEITCH in the Chair, and twenty members present.

Awards Recommended:—

Silver Flora Medal.

To the Lady Wernher, Luton Hoo (gr. Mr. Metcalfe), for Calanthes.
To Messrs. Charlesworth, for hybrids.
To Messrs. Sander, for a group.
To Messrs. Stuart Low, for a group.
To Messrs. J. Cypher, for Cypripediums.

Silver Banksian Medal.

To Mr. W. A. Manda, for *Cattleya Trianae.*

To Messrs. Hassall, for a group.

First-class Certificate.

To *Cattleya* × 'Enid' var. 'F. Lambeau' (*Mossiae Reineckiana* × *Warscewiczii* 'Frau Melanie Beyrodt') (votes, unanimous), from Monsieur Firmin Lambeau, Brussels. Flowers pure white with purple veining on the front of the lip.

Award of Merit.

To *Laeliocattleya* × *Firminii* var. *ardens* (L.-C. × '*Ceres*' × *C. Dowiana aurea* (votes, unanimous), from Monsieur F. Lambeau. Flowers coppery orange, with ruby crimson lip having a yellow disc.

To *Odontioda* × 'Madeline' var. 'Prince of Orange' (*Odontioda* × *Charlesworthii* × *Odontoglossum crispum*) (votes, 14 for, 2 against), from C. J. Phillips, Esq., Sevenoaks (gr. Mr. Bucknell). A singular colour variation, the flowers partaking most of *O. crispum* in size; pale yellow, with pale reddish lilac markings on the minor halves of the segments.

To *Sophrocattleya* × 'Saxa,' Orchid Dene variety (*S. grandiflora* × *C. Trianae*) (votes, 13 for, 1 against), from E. H. Davidson, Esq., Orchid Dene, Twyford. Flowers 3 inches across; rose colour with yellow base to the lip.

To *Odontoglossum* × 'Aireworth,' Goodson's variety (× *Lambeauianum* × *crispum*) (votes 16 for, 2 against), from H. S. Goodson, Esq., Putney (gr. Mr. G. E. Day). A good large rose-tinted flower, with the inner halves of the sepals and petals marked with reddish brown.

To *Coelogyne* × *intermedia* (*cristata Lemoniana* × *Massangeana*) (votes, 13 for, 2 against), from Messrs. Cypher, Cheltenham. Flowers in slender sprays, white with yellow centre to the lip.

Other Exhibits.

Sir Jeremiah Colman, Bart.: rare Orchids.

C. J. Phillips, Esq.: Odontiodas.

Francis Wellesley, Esq.: Cypripediums.

Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O.: Cypripediums.

Baron Bruno Schröder: *Laelia anceps Hilliana.*

ORCHID COMMITTEE, FEBRUARY 4, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-three members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Charlesworth for a group.

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for a group of curious species and hybrids.

FIG. 111.—PRIMULA × 'JEAN DOUGLAS.' (*Gard. Chron.*) (p. lxi.)

[*To face p.* lxviii.

FIG. 112.—HELICHRYSUM BELLIDIOIDES. (*Gard. Chron.*) (p. lxiii.)

FIG. 113.—ODONTOGLOSSUM PESCATOREI SANDERAE. (p. lxvi.)

FIG. 114.—MILTONIODA × HARWOODII, MOSS'S VARIETY. (p. lxxxi.)

[*To face p.* lxix.

To Messrs. Cypher, Cheltenham, for Cypripediums, Calanthes, &c.
To Messrs. Jas. Veitch for hybrids.
To Mr. W. A. Manda, St. Albans, for a group of *Cattleya Trianae*.
To Messrs. Stuart Low, Enfield, for a group.

Bronze Banksian Medal.

To Messrs. Hassall, Southgate, for hybrid Odontoglossums &c.

First-class Certificate.

To *Odontoglossum* × *ardentissimum* var. 'Ebor' (*Pescatorei* × *crispum*) (votes, unanimous), from Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill). Flowers the largest of its class, white evenly blotched with deep claret-red. The plant bore a spike of 21 flowers. (Fig. 115.)

To *Cymbidium* × 'Lady Colman' var. 'Golden Queen' (*eburneo-Lowianum* × *Tracyanum*) (votes, unanimous), from Sir Jeremiah Colman, Bart. (gr. Mr. Collier). Flowers nearest to *C. Tracyanum*, golden yellow with dotted lines of red, and red-brown markings on the lip. (Fig. 116.)

Award of Merit.

To *Cymbidium* × *glebelandense* var. 'J. Davis' (*Schröderi* × *insigne*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). Habit resembling *C. insigne*. Inflorescence 4 feet high. Flowers large, pale buff with reddish lines; lip white with red-brown markings.

To *Odontoglossum* × *amandum* (*Pescatorei* × *Wilckeanum*) (votes, unanimous), from C. J. Phillips, Esq., The Glebe, Sevenoaks (gr. Mr. Bucknell). A very distinct hybrid with white flowers of firm substance, the petals having several large claret-red blotches; the petals a broad band of the same colour across the middle. Lip broad, white with a purple band in front of the yellow crest.

To *Oncidioda* × *Cooksoniae* (*Oncidium macranthum* × *Cochlioda Noezliana*) (votes, unanimous), from Messrs. Charlesworth. Habit of *O. macranthum* but more slender and with smaller flowers, having the sepals dark red, the petals lighter red tipped with yellow, and a narrow trilobed dark-red lip.

Other Exhibits.

Lieut.-Colonel Sir G. L. Holford, K.C.V.O. (gr. Mr. H. G. Alexander): new varieties of *Cymbidium Gottianum*; and other hybrids.
Sir Jeremiah Colman, Bart.: hybrids.
H. S. Goodson, Esq.: Odontoglossums.
C. J. Phillips, Esq.: Odontoglossums.
de B. Crawshay, Esq.: Odontoglossums.
H. J. Bromilow, Esq.: *Cypripedium* × 'Alcibiades' *illustris*.
Mr. E. V. Low: varieties of *Cattleya Trianae*.

ORCHID COMMITTEE, FEBRUARY 18, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-five members present.

Awards Recommended :—

Silver Flora Medal.

To H. S. Goodson, Esq., Putney (gr. Mr. G. E. Day), for a group.

To Messrs. Charlesworth, Haywards Heath, for hybrid Odontoglossums, Odontiodas, &c.

To Messrs. Sander, St. Albans, for a group in which were over fifty forms of *Cattleya Trianae*.

Silver Banksian Medal.

To Messrs. Cypher, Cheltenham, for a group.

To Messrs. McBean, Cooksbridge, for hybrid Cymbidiums, &c.

To Messrs. Stuart Low, Enfield, for a group.

To the Liverpool Horticultural Company, for Laeliocattleyas.

To Mr. W. A. Manda, St. Albans, for *Cattleya Trianae*.

First-class Certificate.

To *Cattleya Trianae* 'The Baron' (votes, unanimous), from Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill). A large and finely formed pure white variety with a pale pink tint in front of the yellow disc of the lip.

To *Cymbidium* × *Alexanderi*, Fowler's variety (*insigne* × *eburneo-Lowianum*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). Flowers large and with all the segments equally broad, rose-pink with dotted red lines; the cream-coloured lip having effective red marking. (Fig. 117.)

To *Odontoglossum* × 'Amethyst,' Glebelands variety (*Lambeauianum* × *eximium*) (votes, unanimous), from J. Gurney Fowler, Esq. Flowers deep reddish purple, with white markings on the outer halves of the segments, and white front to the lip. (Fig. 118.)

To *Brassocattleya* × 'Menda' (*B.-c.* × *Digbyano-Mossiae* 'Queen Alexandra' × *C. labiata* 'Virginia') (votes, unanimous), from Pantia Ralli, Esq., Ashtead Park. A large and beautiful blush-white flower, the fringed lip of which has a purple line in front of the greenish-yellow disc.

To *Brassocattleya* × *Vilmoriniana*, Goodson's variety (*B.-c.* × Mrs. J. Leemann × *C. Mossiae*) (votes, unanimous), from H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. G. E. Day). Flower among the largest and best of its class, deep rosy-mauve, the large fringed lip having an orange centre.

Award of Merit.

To *Cattleya* × 'Leda' (*Percivaliana* × *Dowiana aurea*) (votes, unanimous), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O. (gr.

Mr. H. G. Alexander). A fine deep rose flower with gold veining in the lip.

Other Exhibits.

Baron Bruno Schröder: *Odontoglossum crispum* 'The Dell Sunrise,' and White Cattleyas.

Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O.: hybrid Cymbidiums.

Samuel Gratrix, Esq. (gr. Mr. Brown): *Odontoglossum crispum* 'Leonard Perfect.'

F. M. Ogilvie, Esq. (gr. Mr. Balmforth): *Odontioda* × 'Mrs. F. M. Ogilvie' and *Odontoglossum crispum* 'Lady Jane.'

H. T. Pitt, Esq. (gr. Mr. Thurgood): *Odontoglossum* × *eximium* 'Perdita.'

E. de Q. Quincey, Esq.: *Cattleya Trianae* 'The Admiral' and hybrid Cypripedium.

Miss Baker Baker: *Bletia hyacinthina Gebina.*

ORCHID COMMITTEE, MARCH 4, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-five members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a group.

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for rare species and hybrids.

To Messrs. Stuart Low, Enfield, for a group.

To Messrs. Cypher, Cheltenham, for a group.

First-class Certificate.

To *Odontoglossum* × *eximium* 'Alpha' (*ardentissimum* × *crispum*) (votes, unanimous), from Messrs. McBean, Cooksbridge. A very large and handsome flower, white, densely blotched with claret. (Fig. 123.)

Award of Merit.

To *Cattleya Trianae* 'Colossal' (votes, unanimous), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O., Westonbirt (gr. Mr. H. G. Alexander). One of the largest forms, and near to *C. Trianae* 'The Premier.' Flowers rose-pink with a purple front to the lip, which has a crimped lilac margin.

To *Miltonioda* × *Harwoodii*, Moss's var. (*M. vexillaria* × *C. Noezliana*) (votes, unanimous), from J. S. Moss, Esq., Wintershill, Bishop's Waltham (gr. Mr. Kench). Flowers deep magenta-rose. (Fig. 114.)

To *Dendrobium bigibbum* 'Lady Colman' (votes, unanimous), from Sir Jeremiah Colman, Bart., Gatton Park (gr. Mr. Collier). A

pretty albino form, with white flowers having a faint blush tint. (Fig. 119.)

To *Laeliocattleya* × *'Smilax'* var. 'Prince of Orange' (*L.-c.* × *Charlesworthii* × *C.* × 'Enid') (votes, unanimous), from Messrs. McBean, Cooksbridge. Flowers orange colour with dark claret front to the lip.

To *Odontioda* × *Mossiae* (*O. maculatum* × *C. Noezliana*) (votes, 16 for, 4 against), from J. S. Moss, Esq. Flowers bright red, the distinctly lobed labellum the lighter in tint.

To *Oncidioda* × *Cooksoniae*, Ralli's var. (*Oncidium macranthum* × *Cochlioda Noezliana*) (votes, 15 for, 4 against), from Pantia Ralli, Esq., Ashtead Park, Surrey. A better form of the hybrid which was given an Award of Merit, February 4. Flowers dark red. (Fig. 120.)

Cultural Commendation.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., K.C.V.O., for a fine specimen of *Sophrolaelia* × 'Psyche' (*L. cinnabarina* × *S. grandiflora*) with sixty flowers.

To Mr. J. E. Shill, gr. to Baron Bruno Schröder, for a specimen of *Coelogyne pandurata* with two fine spikes.

Other Exhibits.

E. H. Davidson, Esq., Twyford: fine hybrids.

Sir Jeremiah Colman, Bart.: rare species.

Messrs. Hassall: Brassocattleyas, &c.

Sir Trevor Lawrence, Bart., K.C.V.O.: spike of *Eulophiella Peetersiana* with seventeen flowers and buds.

H. S. Goodson, Esq.: Odontoglossums.

F. Menteith Ogilvie, Esq.: Odontiodas.

Walter Cobb, Esq.: Odontiodas, &c.

Mrs. Norman Cookson: *Odontioda Bradshawiae.*

Messrs. Jas. Veitch: *Eulophiella Elisabethae.*

Monsieur H. Graire: hybrid Odontoglossums.

Mr. W. A. Manda: *Cattleya Trianae.*

Messrs. Armstrong and Brown: *Dendrobium* × 'Sibyl' (*crassinode* × *Findlayanum*).

ORCHID COMMITTEE, MARCH 18, 1913.

Sir HARRY J. VEITCH in the Chair, and twenty-three members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Armstrong and Brown, Tunbridge Wells, for Dendrobiums, Odontiodas, &c.

To Messrs. Sander, St. Albans, for *Cattleya Schröderae* and hybrids.

FIG. 115.—ODONTOGLOSSUM × ARDENTISSIMUM VAR. 'EBOR.' (p. lxix.)

[*To face p.* lxxii.

FIG. 116.—CYMBIDIUM × 'LADY COLMAN' VAR. 'GOLDEN QUEEN.' (p. lxix.)

FIG. 117.—CYMBIDIUM × ALEXANDERI, FOWLER'S VARIETY. (p. lxx.)

FIG. 118.—ODONTOGLOSSUM × 'AMETHYST,' GLEBELAND'S VARIETY. (p. lxxiii.)

[*To face p.* lxxiii.

To Messrs. Stuart Low, Enfield, for a group.
To Messrs. Charlesworth, Haywards Heath, for hybrids.

Silver Banksian Medal.

To Mr. Sidney Flory, Twickenham, for hybrids and species.
To Messrs. Hassall, Southgate, for a group.

First-class Certificate.

To *Brassocattleya* × *Cliftonii magnifica* (*B.-c.* × *Digbyano-Mossiae* × *C. Trianae*, Uplands var.) (votes, unanimous), from F. M. Ogilvie, Esq., Oxford (gr. Mr. Balmforth). Sepals and petals rosy mauve; lip large, fringed, deep rose-purple in front, margin lilac.

Award of Merit.

To *Cattleya* × 'Tityus,' Shrubbery var. (× 'Enid' × 'Octave Doin') (votes, 16 for, 0 against), from F. M. Ogilvie, Esq. Sepals and broad crimped petals, white tinged with pink; lip crimson with yellow disc.

To *Cattleya* × 'Magnet' (*Mossiae* × *Whitei*) (votes, 11 for, 5 against), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O. (gr. Mr. H. G. Alexander). Flowers shaped like *C. Schilleriana*, rose-purple, with claret lines on the lip; six on a spike.

To *Cattleya Trianae alba* 'Souvenir de Louis Verdonck' (votes, 13 for, 0 against), from Monsieur Jules Hye de Crom, Ghent. A clear white form of good shape.

To *Odontoglossum crispum*, Cobb's var. (votes, 10 for, 1 against), from Walter Cobb, Esq., Normanhurst, Rusper (gr. Mr. Salter). A typical white form with large brown blotches on the sepals.

Cultural Commendation.

To Messrs. Charlesworth for a fine specimen of *Odontioda Bradshawiae*.

To Mr. W. H. White for *Odontoglossum pulchellum*, and *O. Rossii majus*, grown at Burford thirty years.

Other Exhibits.

E. H. Davidson, Esq., Twyford: new Orchids.
Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O.: new hybrids.
de B. Crawshay, Esq.: Odontoglossums.
F. M. Ogilvie, Esq.: *Odontioda* × 'Red Riding Hood' (*Odontoglossum Rossii* × *O. Bradshawiae*).
Pantia Ralli, Esq.: *Cattleya Trianae* 'Empress of India.'
Baron Bruno Schröder: *Cattleya Schröderae* 'Madame Dina Beaumer.'
Sir Jeremiah Colman, Bart.: *Dendrobium* 'H. S. Goodson,' and Laeliocattleyas.
Monsieur Jules Hye de Crom: *Miltonia Hyeana* 'Stella.'

ORCHID COMMITTEE, APRIL 1, 1913.

Sir HARRY J. VEITCH in the Chair, and twenty-four members present.

Awards Recommended :—

Silver Flora Medal.

To H. T. Pitt, Esq., Roslyn, Stamford Hill (gr. Mr. Thurgood) for hybrid Odontoglossums and other Orchids.

To Messrs. Armstrong and Brown, Tunbridge Wells, for hybrids and showy species.

To Messrs. Sander, St. Albans, for hybrids, *Cattleya Schröderae*, &c.

Silver Banksian Medal.

To H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. G. E. Day), for Odontiodas and Odontoglossums.

To Mr. Sidney Flory, Tracy's Nursery, Twickenham, for a group of *Cattleya Schröderae* and other species.

To Messrs. Stuart Low, Enfield, for a group.

Bronze Banksian Medal.

To Messrs. Hassall, Southgate, for a group.

First-class Certificate.

To *Brassocattleya* × *heatonensis* 'Canary' (*B. Digbyana* × *C.* × *Hardyana*) (votes, unanimous), from Lieut.-Colonel Sir George L. Holford, K.C.V.O., Westonbirt (gr. Mr. H. G. Alexander). A very distinct form with large canary-yellow flowers, with rose-pink markings in front of the pale greenish yellow disc of the lip.

To *Cypripedium* × 'Roundhead' (× *nitens* × 'Earl of Tankerville') (votes, unanimous), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O. An improvement on *C.* × 'Earl of Tankerville.' Flowers yellow with a clear white upper half to the dorsal sepal, which has lines of large blackish spots.

To *Cymbidium Humblotii* (votes, unanimous). From Messrs. Charlesworth, Haywards Heath. A large growing scandent species from Madagascar. Inflorescence branched. Flowers 2 inches across, pale green with black markings on the lip. (Fig. 121.)

To *Odontoglossum* × *eximium*, Warnham Court var. (*ardentissimum* × *crispum Lucianii*) (votes, unanimous), from C. J. Lucas, Esq., Warnham Court (gr. Mr. Duncan). A flower of perfect shape, white, heavily blotched with claret.

To *Laeliocattleya* × *Dominiana*, Southfield var. (*L. purpurata* × *C. Dowiana*) (votes, unanimous), from W. Waters Butler, Esq., Southfield, Edgbaston. Flowers large rose-purple with a yellow tint on the petals ; lip deep mulberry-red.

Award of Merit.

To *Cattleya* × *intertexta Juliettae* (*Warneri alba* × *Mossiae alba*) (votes, unanimous), from Monsieur Firmin Lambeau, Brussels. A fine pure *Cattleya* with chrome-yellow markings in the lip.

To *Odontioda* × *Cooksoniae*, Ralli's var. (*O.* × *ardentissimum* × *C. Noezliana*) (votes, 16 for, 0 against), from Pantia Ralli, Esq., Ashtead Park (gr. Mr. Farnes). Flowers glowing red with whitish front to the lip.

To *Odontioda* × *keighleyensis ignifera* (*O. cirrhosum* × *C. Noezliana*) (votes, 17 for, 1 against) from Messrs. McBean, Cooksbridge. Flowers deep scarlet.

Cultural Commendation.

To Messrs. Charlesworth for *Cymbidium Humblotii* with an inflorescence 5 feet in height and having six branches bearing together 110 flowers.

Other Exhibits.

Sir Jeremiah Colman, Bart.: Odontiodas.
E. H. Davidson, Esq.: *Cattleya Schröderae.*
C. J. Phillips, Esq.: *Odontioda* × 'Coronation.'
Colonel J. Rutherford: *Cymbidium Parishii.*
W. Waters Butler, Esq.: *Cattleya* × 'Tityus.'
F. M. Ogilvie, Esq.: *Odontoglossum Ossulstoni.*
de B. Crawshay, Esq.: Odontoglossums.
Messrs. Jas. Veitch: two hybrids.
Messrs. McBean: Cattleyas, &c.
J. S. Moss, Esq.: *Odontioda* × *Bradshawiae ardens.*

ORCHID COMMITTEE, APRIL 15, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-five members present.

Awards Recommended:—

Silver Flora Medal.

To E. H. Davidson, Esq., Twyford, for rare Orchids.
To Messrs. Sander, St. Albans, for species and hybrids.
To Messrs. Charlesworth, Haywards Heath, for choice Orchids.
To Mr. Sidney Flory for *Cattleya Schröderae*, Odontoglossums, &c.

Silver Banksian Medal.

To Messrs. Hassall, Southgate, for a group.
To H. S. Goodson, Esq., Putney (gr. Mr. G. E. Day) for a group.

First-class Certificate.

To *Odontoglossum Pescatorei* 'Lady Holford' (votes, 14 for, 7 against), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O., Westonbirt (gr. Mr. H. G. Alexander). A superb form with finely-shaped flowers 3½ inches across; white tinged with lilac on the sepals. (Fig. 122.)

To *Laeliocattleya* × *luminosa*, Holford's var. (*L. tenebrosa*, Walton Grange var. × *C. Dowiana aurea*) (votes, unanimous), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O. Sepals and petals dark canary-yellow; lip violet purple.

To *Brassolaeliocattleya* × 'King Emperor' (*B.-c.* × *Digbyano-Mossiae* × *L.-c.* × *callistoglossa*) (votes, unanimous), from W. R. Lee, Esq., Plumpton Hall, Heywood (gr. Mr. Branch). A magnificent hybrid with flowers over 8 inches across, rose-purple with intense claret-crimson fringed lip.

Award of Merit.

Maxillaria Fletcheriana (votes, unanimous), from Messrs. Sander, St. Albans. Flowers on erect sheathed scapes, large, cream-white with purple lines. Imported from Peru.

Cultural Commendation.

To Mr. Balmforth, gr. to F. M. Ogilvie, Esq., for a fine plant shown as *Odontioda* × *Devossiana*, but closely resembling *Odontoglossum Thompsonianum*.

Bronze Banksian Medal.

To Mr. C. F. Waters, Balcombe, for Lycastes.

Other Exhibits.

Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O.: *Cattleya Schröderae* 'The Baron' with six flowers.

W. R. Lee, Esq.: two fine Odontiodas.

William Thompson, Esq.: Odontoglossums.

Mr. Alwyn Harrison: Dendrobiums.

Pantia Ralli, Esq.: *Laeliocattleya* × *Dominiana*.

Sir Trevor Lawrence, Bart.: *Brassolaeliocattleya* × 'Triune.'

ORCHID COMMITTEE, APRIL 29, 1913.

J. GURNEY FOWLER, Esq., in the Chair, and fifteen members present.

Awards Recommended:

Silver Flora Medal.

To Messrs. Cypher, Cheltenham, for *Miltonia vexillaria*, Dendrobiums, &c.

Silver Banksian Medal.

To Messrs. Hassall, Southgate, for Cattleyas and Odontoglossums.

To Mr. C. F. Waters, Balcombe, for a group.

To Mr. Jensen, Lindfield, for *Cattleya Mendelii* and *Odontoglossum crispum*.

FIG. 119.—DENDROBIUM BIGIBBUM VAR. 'LADY COLMAN.' (p. lxxi.)

[*To face p.* lxxvi.

FIG. 120.—ONCIDIODA × COOKSONIAE, RALLI'S VAR. (p. lxxii.)

FIG. 121.—CYMBIDIUM HUMBLOTTII. (*Charlesworth.*)
(p. lxxiv.)

FIG. 122.—ODONTOGLOSSUM PESCATOREI 'LADY HOLFORD.' (*Gard. Chron.*) (p. lxxv.)

[*To face p.* lxxvii.

Award of Merit.

To *Odontoglossum* × *amabile* 'Zeus' (*crispum* × *crispo-Harry-anum*) (votes, 10 for, 4 against) from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O. (gr. Mr. H. G. Alexander). A large and perfect white flower with heavy red-purple blotches on the inner halves of the segments. Lip white with yellow crest and dark-red blotch.

Cultural Commendation.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., for a fine specimen of *Epidendrum leucochilum.*

Other Exhibits.

Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O.: Laeliocattleyas.

The Rt. Hon. Lord Grantley, Cirencester: *Chysis bractescens,* shown as a cross between that species and a *Phaius.*

H. S. Goodson, Esq: Odontoglossums.

Messrs. Sander: *Cattleya Mendelii.*

Messrs. Jas. Veitch: *Brassolaeliocattleya* × 'Gerald.'

TESTIMONIAL TO THE REV. W. WILKS, M.A., V.M.H.,

For Twenty-five Years Secretary of the Royal Horticultural Society.

As a result of the addendum by Sir Trevor Lawrence, K.C.V.O., V.M.H., at that time President of the Society, to the Report of the Council for 1912 (see p. xii), it was suggested that a presentation should be made to the Rev. W. Wilks by the Fellows of the Society, as an expression of their appreciation of his great work and their regard for him personally. A subscription fund was accordingly opened to which a very hearty response was quickly made, a total of £611 being subscribed. At the Annual Meeting of the Society on February 11th, a beautiful silver salver, suitably inscribed, was presented to him and later a cheque for the balance.

The following is a list of the subscribers :—

'A.M.M.' and 'F.R.D.,' 'A.T.P.,' Fredk. C. Adams, R. H. Adams, F. N. Adkin, H. W. Adnitt, Mrs. Lockett Agnew, Minister for Agriculture, H. G. Alexander, Henry Allan, Mrs. J. H. Allan, Mrs. W. Allan, E. J. Anderson, Rear-Admiral A. H. Anson, Mrs. A. Ardern, Mrs. John Arkcoll, John Arkcoll, Mrs. Florence E. Armstrong, T. Armstrong, Mrs. M. Arnold, Miss L. B. Ashford, John Aste, Sir F. E. Astley-Corbett, Bart., Miss Emily Aston.

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The Secretary desires to return his heartiest thanks to all the kind subscribers mentioned above, and to assure them that though many of the newspapers have announced his immediate retirement from the secretaryship of the Society he has no intention whatever of so doing as long as health and strength, and the general support of the Fellows, are continued to him. He has far too great an affection for the Society, which he has seen rise from its ruins to its present commanding position, to willingly separate himself from so many kind friends and congenial work. He again thanks both one and all most heartily for their great kindness and indulgence towards him during the past five-and-twenty years.

W. WILKS, Sec. R.H.S.

ESTABLISHED
1804.

INCORPORATED
1909.

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LONDON."

TELEPHONE:
5363 VICTORIA.

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

1. General.
2. Letters.
3. Telephone and Telegrams.
4. Journals Wanted.
5. Subscriptions.
6. Form of Bequest.
7. Privileges of Chemical Analysis.
8. List of Fellows.
9. New Fellows.
10. An Appeal.
11. R.H.S. Gardeners' Diary.
12. Lindley Library.
13. The Society's Gardens at Wisley.
14. Rock Garden at Wisley.
15. The Wisley Research Station.
16. Students at Wisley.
17. Distribution of Surplus Plants.
18. Exhibitions, Meetings, and Lectures in 1913.
19. A National Diploma in Horticulture.
20. Dahlia Prizes.
21. Inspection of Growing Dahlias.
22. Information.
23. Inspection of Fellows' Gardens.
24. Affiliation of Local Societies.
25. Affiliated Societies Certificate Cards.
26. Union of Horticultural Mutual Improvement Societies.
27. Rules for Judging—1911 Code.
28. Daffodil Year Book.
29. Recognition of Diligent Interest in Plants.
30. Disbudding of Orchids.
31. Advertisements.

1. GENERAL.

Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the " Book of Arrangements " and of the " Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on *all* subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number: **5363 VICTORIA.**
"**HORTENSIA, SOWEST LONDON,**" is sufficient address for telegrams.

4. JOURNALS WANTED.

The Secretary would be greatly obliged by the return to the Society of ANY NUMBERS of the JOURNAL which may be of no further use to Fellows. Complete sets are occasionally applied for, but, at the present moment, not even one can be supplied owing to the stock of the following being exhausted :—

VOLUME IV. Part 14.
VOLUME V. Part 1.
VOLUME X.
VOLUME XIII. Part 1.
VOLUME XIV.
VOLUME XV. Parts 2 and 3.
VOLUME XXXVIII. Part 3.

These are, therefore, particularly asked for.

5. SUBSCRIPTIONS.

All annual subscriptions are payable in advance on the 1st day of January in each year. A Fellow, if elected before the 1st of July, shall pay the annual subscription for the current year ; if elected after the 1st of July and before the 1st of October, he shall pay half a year's subscription ; if elected after the 1st of October and before the 1st of January, he shall pay at the time of his election the full amount of his subscription for the year commencing from the 1st day of January then next, and no further subscription until the next succeeding 1st of January. To avoid the inconvenience of remembering their subscriptions Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments ; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. It may be a week or more before the Tickets reach the Fellows, owing to the very large number (over 20,000) to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society ; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas, and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society," and crossed "London County and Westminster Bank Victoria Branch, S.W."

6. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £....., to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease ; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

7. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 107 in the " Book of Arrangements," 1913.

8. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the address insufficient, they are requested to inform the Secretary at once. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL (Advt. pp. 32, 33) and the " Book of Arrangements."

9. NEW FELLOWS.

The President and Council fully appreciate how much the prosperity of the Society and its present large number of Fellows are due to the efforts of Fellows to enlist the sympathy of their friends ; and the steady advance during recent years indicates the increasing recognition of the Society's work and usefulness. But it must not be supposed that a maximum has yet been reached. There is ample room for a great increase of Fellows, especially in America and the Colonies.

10. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows ; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially by :—

1. Increasing the Number of Fellows.
2. Helping to swell the Fund for providing Prizes for the Students at Wisley.
3. Providing Lectures with Lantern Slides.
4. Presenting Books to fill the gaps in the Library both at Vincent Square and at Wisley.
5. Sending new or rare Plants and Seeds for the Garden and surplus Roots for distribution to the Fellows.
6. Sending Plants for the *New Rock Garden* at Wisley.

Thus there is plenty for all to do according to their individual liking : personal effort, money, plants, books, are all alike needed. The

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

Secretary asks those who read these lines to help in the ways above indicated.

11. R.H.S. GARDENERS' DIARY.

The R.H.S. Gardeners' Diary for 1914 will be issued in November. It will contain a considerable quantity of new information, and it has been compiled more especially for the single-handed gardener. The price is 1*s.* 1*d.*, post free, from the R.H.S. Office, Vincent Square, London, S.W. ; or 2*s.* 1*d.* if leather-bound.

12. LINDLEY LIBRARY.

The Society, acting in and through its Council, having now become sole trustee of the Lindley Library, Fellows and friends of the R.H.S. have the encouragement of knowing that their gifts to the Library can never be lost to the Society, but are attached to it in perpetuity. It should now be the aim of all to make the Library far more perfect and complete than it is at present. Gifts of books, old or new, will be gratefully accepted.

13. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets, from 9 A.M. till sunset, except on

POSITION OF THE SOCIETY'S GARDENS.

Sundays, Good Friday, Christmas Day, and Exhibition Days. Each Fellow's Ticket admits three to the Gardens. The Public are not admitted.

The Gardens, situated at Wisley (about 2 miles from Ripley, in Surrey), are about 3 miles from Byfleet, 3½ miles from Horsley, and 5½ miles from Weybridge, all stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey; the charge being, to and from Weybridge, waiting two hours at the Gardens, 8*s*.; or waiting three hours, 10*s*.; or to and from Horsley, 7*s*.; Effingham Junction, 7*s*.; Byfleet, 7*s*. Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Carriages can also be obtained at Weybridge for 8*s*. by writing to Mr. Trembling, New Road, Weybridge. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

The motor route from London to Wisley will be found in the "Book of Arrangements," p. 146.

14. ROCK GARDEN AT WISLEY.

In consequence of the rapidly increasing interest taken in what are popularly called "Alpine Plants," "Alpines," or "Rock Plants," the Council have constructed a Rock Garden at Wisley on a somewhat extensive scale. The idea is to obtain the best possible positions and soils for the different plants to grow in, the growth and well-being of the plants being considered to be of even greater importance than the artistic effect of the rockwork. In a Horticultural Society's Garden every single detail should teach something, so that Fellows visiting it may be able to take away an idea of how best to do this or that, or where best to plant this or that. The construction of the Rock Garden is completed, and the planting is proceeding, but it will be two, or possibly three, years or more before the plants on it can be seen at their best.

An Alpine Plant House has been erected above the Rock Garden, chiefly for the purpose of growing those rock plants to perfection which blossom too early to withstand our wet winters and late spring frosts. In this House Fellows will be able to see such plants in flower from February onwards.

15. THE WISLEY RESEARCH STATION.

Investigations are now in full swing at the new Research Station and Laboratory at Wisley. All communications relating to them should be addressed to Mr. F. J. Chittenden, F.L.S., Director of the Research Work on Scientific Matters affecting Practical Horticulture and Lecturer to the Students.

16. STUDENTS AT WISLEY.

N.B.—There will be a few vacancies for the two years' Course commencing in September 1913. Early application should be made to the Secretary.

The Society admits young men, between the ages of sixteen and twenty-two years, to study Gardening at Wisley. The curriculum includes not only practical garden work in all the main branches of Horticulture, but also Lectures, Demonstrations, and Horticultural Science in the Laboratory, whereby a practical knowledge of Garden Chemistry, Biology, &c., may be obtained.

17. DISTRIBUTION OF SURPLUS PLANTS.

In a past Report the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock, which must either be given away or go to the waste-heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded ; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants ? It was, therefore, decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by Ballot.

Fellows are, therefore, particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution is permitted. The great majority also are, of necessity, *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the " Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot ; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is, therefore, obvious that when the Ballot is kind to any Fellow he will receive the majority of the plants he has selected, but when the Ballot has given him an unfavourable place he may find the stock of almost all the plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in

a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Gardens cannot be disorganized by the sending out of plants at any later time in the year. All Fellows can participate in the annual distribution *following* their election.

The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form. It is impracticable to send plants by post, owing to the lack of Post Office facilities for despatch without prepayment of postage.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries ; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

No plants will be sent to Fellows whose subscription is in arrear, or who do not fill up their forms properly.

18. EXHIBITIONS, MEETINGS, AND LECTURES IN 1913.

The programme will be found in the " Book of Arrangements " for 1913. An Exhibition and Meeting is held practically every fortnight throughout the year, and a short lecture on some subject connected with Horticulture is delivered during the afternoon.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (31) of halfpenny cards *ready addressed* to himself.

19. A NATIONAL DIPLOMA IN HORTICULTURE.

Most gardeners will welcome the initiation by the Society of a scheme whereby a National Diploma in Horticulture may be gained by those who pass the Preliminary and Final Examinations which will be required. The Diploma will be thoroughly " National," for by the consent of H.M. Government the Department of Agriculture, after being approached in the matter, has consented to co-operate with the Society if the Society will undertake the work of organizing the Examinations, and has authorized that the Diploma shall bear the following words : " Awarded by the Royal Horticultural Society under a scheme approved by the Board of Agriculture."

The Examinations will be written, viva voce, and practical. The practical part will be held in suitable gardens at convenient centres in the country. The first Diploma Examination will be held in June

1914, and thereafter annually. Fuller information will appear with the Syllabus shortly, until which time it is requested that no letters of inquiry may be sent.

20. DAHLIA PRIZES AT THE R.H.S. MEETING ON SEPTEMBER 23, 1913.

The object of this competition is not so much to attract the finest cut blooms as seen on the Show stand, for such flowers may, when growing on the plant, be almost invisible, and no contribution to the decoration of the Garden, whatever they may be for cutting. The object is to discover the most Decorative Garden Dahlias—that is, those varieties which add most to the beauty of the Garden, and, as is well known, not a few of the most glorious Dahlia flowers add nothing to the aspect of the Garden as they are hidden beneath the foliage. They may be excellent to grow in the Kitchen Garden to cut for house decoration, but they are useless for the ornamentation of the Pleasure Garden. (See paragraph 21.) So-called Show Dahlias *may* also be Decorative and therefore eligible.

SCHEDULE.

Class A. Amateurs. A group of Decorative Garden Dahlias of all or any sections. Twelve feet run of 3 feet tabling, not to be built up more than 8 feet in height from the ground level.

First Prize : R.H.S. Silver Cup, to which will be added the Veitch Memorial Medal.

The Council may make other awards according to merit.

Class B. Open. A group of Decorative Garden Dahlias of all or any sections. Twenty-five feet run of 3 feet tabling, not to be built up more than 8 feet in height from the ground level.

First Prize : Seventy-five Guinea Challenge Cup, presented to the R.H.S. by Reginald Cory, Esq.

The Council will make other awards according to merit.

In both Classes all the stems must touch the water, and no wiring or artificial support will be allowed. Hardy foliage or grasses may be employed for decoration.

The winner will hold the Cory Cup for one year, subject to a sufficient insurance against loss, and to a guarantee to return it in good condition, or, failing this, to refund to the R.H.S. the sum of eighty guineas. On the return of the Cup the Council will present the holder with a smaller commemorative Silver Cup.

The same exhibitor may win the Cup only once in three years, but should the winner of the previous year be again considered first the Council will bestow a special award.

The decision of the Council is final, and the Cup may be altogether withheld at their discretion.

The Council will not award this high distinction unless satisfied and assured that the exhibit is, in the main, due to the work and capability

of the exhibitor or his employees, and on this point the Council may consult any expert not competing for the Cup.

The attention of intending exhibitors is particularly directed to the Society's 1911 Code of "Rules for Judging."

21. INSPECTION OF GROWING DAHLIAS.

In order to assist in the adjudication of the Cory Cup award (see paragraph 20) it has been suggested to the Council that the Judges should inspect a very large collection of Decorative Garden Dahlias which will be growing in Mr. Reginald Cory's Garden at Cardiff, where the habit of the respective plants can be observed, and their true value from the point of view of garden decoration can be determined. Three Judges of the R.H.S. Floral Committee are accordingly co-operating with three Judges of the National Dahlia Society, with the Chairman of the Floral Committee as President, and a visit to Mr. Cory's Garden will be made in the week preceding the date of the competition for the Cup. The object of this inspection of the growing plants is to prevent the Judges for the Cup being misled as to a plant's value as a Decorative Garden Plant, by blooms however intrinsically beautiful, but gathered from a plant of little value as a Decorative Garden Plant.

22. INFORMATION.

Fellows may obtain information and advice from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions, by applying to the Secretary, R.H.S., Vincent Square, Westminster, S.W. Where at all practicable it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

23. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost—viz. a fee of £3 3*s*. for one day (or £5 5*s*. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Gardens. Gardens can only be inspected at the *written* request of the *owner*.

24. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of local Horticultural Societies by a scheme of affiliation to the R.H.S.

Since this was initiated no fewer than 330 Societies have joined our ranks, and the number is steadily increasing.

Secretaries of Affiliated Societies can obtain on application a specimen of a Card which the Council have prepared for the use of Affiliated Societies for Certificates, Commendations, &c. Price 3*s.* 6*d.* for 10 copies, 5*s.* 6*d.* for 20, 11*s.* 6*d.* for 50, 20*s.* for 100. (See next par.)

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz. Bronze, 5*s.* 6*d.*, with case complete ; Silver, 12*s.* 6*d.*, with case complete ; Silver-gilt, 16*s.* 6*d.*, with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered, price 6*d.* each.

25. AFFILIATED SOCIETIES' CERTIFICATE CARDS.

At the request of several of the Affiliated Societies, the Council have had the Certificate Card (issued some years ago for the use of Affiliated Societies) beautifully coloured. The uncoloured Card will still continue to be issued at the old prices, and the new coloured Card at 8*d.* a single copy, or 10 for 5*s.*, post free.

26. UNION OF HORTICULTURAL MUTUAL IMPROVEMENT SOCIETIES.

This Union has been established for the encouragement and assistance of Horticultural Mutual Improvement Societies, the object being to strengthen existing Societies, to promote interchange of lecturers, to provide printed lectures, and if possible to increase the number of these useful Societies.

A list of lecturers and their subjects, and a list of typewritten lectures, with or without lantern slides, prepared by the Society, may be obtained from the Secretary, R.H.S., price 3*d.*

Lantern slides on horticultural topics are much needed, and their gift will be very much appreciated.

27. RULES FOR JUDGING—1911 CODE.

The " Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have been revised, and the new edition is now ready. Special attention is drawn to the amended Rule defining " an amateur," with suggestions for establishing four distinct classes of amateurs to meet the requirements of larger or smaller local Societies. (See also p. 37, " Book of Arrangements.") The " pointing " recommended for fruits and vegetables has also been considerably amended, and the terms " annuals " and " biennials " further explained. The Secretaries of Local Societies are advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1*s.* 6*d.*, addressed to the

Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

Exhibitors of vegetables are specially warned that the numbers of specimens to a dish appearing on p. 19 of the 1909 Code of Rules have been still further modified.

28. R.H.S. DAFFODIL YEAR BOOK.

The Council have consented to publish on August 1st a Daffodil Year Book. It will contain the most up-to-date information regarding new varieties of Daffodils; the Awards made at the 1913 Daffodil Shows in London, Birmingham, and elsewhere; special articles; about 2 doz. coloured and other plates, and the Schedule for the 1914 R.H.S. Daffodil Show. All interested in these beautiful Spring flowers are advised to order a copy at once from the Society's Office, Vincent Square, London, S.W. Price 1*s.* 6*d.* post free.

29. RECOGNITION OF DILIGENT INTEREST IN PLANTS.

The Council have founded a Card of "Recognition of Diligent Interest in Plants." Issued in response to frequent applications by school authorities for some token of encouragement of work with plants amongst scholars, it is to be awarded to the boy or girl (or both) who, in the yearly school competitions in plant cultivation, or garden-plot keeping, or Nature study, has secured the first prize. The Cards are 12 inches by 8 inches, and may be had on application to the Secretary, R.H.S., Vincent Square, London, S.W. (price 6*d.* each). The application should contain information as to (*a*) the nature of the competition, (*b*) the number of competitors, (*c*) the judges, (*d*) the number of prizes awarded in the competition, (*e*) the full name of the first prize-winner, and should be signed by the head-teacher and a member of the education authority concerned. The Council of the R.H.S. will at their own absolute discretion grant or withhold this "recognition."

30. DISBUDDING OF ORCHIDS.

At the request of the Orchid Committee the Council have made a rule that "Awards will not be given to any Orchids of which the natural size and character of the flowers have, in the opinion of the Orchid Committee, been in any way changed or improved through the removal of a bud or buds, or part of the spike."

31. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

MAY 14, 1913.

F.-M. Lord GRENFELL, G.C.B., G.C.M.G., in the Chair.

Fellows elected (181).—W. C. Abbott, Mrs. T. Aikman, Miss Aird, L. J. Baggott, Mrs. F. H. Barker, F. O. Bates, A. H. Berly, F. W. Bird, Mrs. Birkbeck, Mrs. H. A. Birkbeck, G. Rowland Blades, Miss Blankley, Mrs. O. Boulton, Mrs. W. Bourne, Miss E. Budgett, Mrs. E. H. Burkitt, Mrs. A. Burton, Mrs. P. Butler, H. F. J. Cantley, Miss M. Carr, G. F. Cattell, D. Citroen, Miss G. Clarke, Mrs. N. L. Cohen, Mrs. E. H. Collins, E. P. Cooke, L. J. F. Cooper, W. P. Crake, Cicely Countess of Cranbrook, J. Crouch, Mrs. J. B. Cullen, Mrs. Dambergi, Mrs. E. T. Daniel, Miss M. A. Deacon, Miss C. Delmege, Miss M. Dence, Mrs. Dickson, Mrs. H. L. Dinwiddy, Max Dittrich, R. S. Donkin, Lady Downes, Mrs. D. Drew, L. F. Dunnett, Mrs. A. J. Edmondson, G. A. Eliott, Mrs. A. E. English, Mrs. G. Eumorfopoulos, J. Goodhart Evans, Mrs. T. Farries, Dr. T. Farthing, F. J. Forster, W. A. Frost, Mrs. Bruce Gardyne, Miss K. C. Garrick, H. E. Gates, Miss J. Gething, Mrs. D. Glennie, H. Goodman, A. Gosheron, F. A. Govett, Mrs. T. A. Greene, E. Guile, B. Gundelfinger, Miss Guttères, Mrs. H. M. Hales, Rev. C. B. Hall, Mrs. W. G. Hall, E. P. Hallowes, G. Halsey, Lady Marjorie D. Hamilton, Mrs. Hands, A. Harley, Lady Lilian Harmsworth, J. Harris, J. Hewitt, S. G. Higgins, A. C. Hill, Lieut.-General Sir James Hills-Johnes, V.C., G.C.B., R. Hirst, Mrs. Hobman, Miss M. B. Hooper, Mrs. R. Horwitz, A. H. Howard, H. B. Hudson, Lady Hyde, T. Johnson, Mrs. Ridge-Jones, F. W. Kent, H. D. Kimber, T. Kime, H. G. Kingham, A. D. Lammin, Mrs. R. D. M. Lang, Mrs. Laverton, W. R. Lee, Mrs. J. D. Lees, Miss Legge, A. Lighton, Mrs. McDiarmid, Mrs. D. MacGregor, Miss M. J. C. McLaughlin, Mrs. Cecil Mangles, Mrs. F. Mangles, P. E. Marshall, Surg.-Gen. A. W. May, C.B., R.N., Mrs. A. Meredith, E. M. Micholls, M.A., Mrs. Miller, Mrs. A. Mitchison, Miss E. Molyneux, Mrs. A. Moore, E. Morse, F. Mortimer, Mrs. D. Moseley, Mrs. J. Muir, G. H. Neame, Col. A. C. Nicholson, E. B. Nix, J. Noaks, Lord Northbourne, Mrs. R. H. Otter, Dr. H. B. Overy, P. W. Owen, G. Pate, Mrs. G. W. Paton, Mrs. C. H. Pearson, C. E. Pierson, T. Ponsonby, Mrs. R. Hart

Prance, G. H. Pritchard, W. E. Rendle, Mrs. Reynard, Miss Richards, Mrs. T. Richards, Miss C. G. Robson, Miss E. Robson, Miss T. Rodber-Horton, Miss Rommel, Dr. O. Rosenheim, Lord Rowallan, A. Saalfeld, Lord St. Davids, Mrs. D. Sampson, C. A. Samuells, Miss W. G. Scarth, Miss C. Sheppard, Mrs. F. F. Sheppee, Lieut.-Col. W. A. Simmonds, Mrs. Slazenger, Rev. H. G. Southcomb, M. Standring, L. Sterne, M. Stevens, Miss Stevenson, Mrs. C. L. Sutherland, Mrs. J. F. Swinford, Mrs. F. J. Synge, Ratan Tata, G. N. Thomson, R. T. Thornton, Mrs. Tothill, Mrs. A. A. Trinder, Mrs. J. S. Turner, S. C. Turner, Miss B. E. W. Waite, Miss I. Walker, F. C. Wall, Mrs. Warde-Aldam, Mrs. Cecil Ward, W. W. Warner, Miss E. F. Warren, Miss E. M. Wenn, J. B. West, Dr. C. P. White, E. White, Mrs. F. W. Whiting, Miss A. Williams, D. T. Willis, Mrs. J. Sladen Wing, Miss L. A. Winter, Rev. D. Woodroffe.

Fellows resident abroad (2).—Léon Houry (France), Ernest W. Morse (Gold Coast).

Associates (5).—H. Cook, H. Drew, Miss E. F. Faulkner, Mrs. von Leth, Miss A. B. Webb.

Societies affiliated (3).—Ealing Tenants' Horticultural Society, N.S.W. Horticultural Association, Port Chalmers Horticultural Society.

A lecture on "The Coco-nut Palm" was given by Sir Everard im Thurn, K.C.M.G. (See p. 324.)

CHELSEA SHOW.

MAY 20, 21, AND 22, 1913.

JUDGES.

ORCHIDS.

Including Davidson Cup.

Bolton, W. W.
Crawshay, de Barri
Fowler, J. Gurney

ROSES.

Jennings, John
Orpen, O. G.
Page Roberts, Rev. F.
Mease, W.

CARNATIONS.

Barnes, N. F.
Blick, C.
Turner, Arthur

TULIPS.

Hall, A. D.
Jacob, Rev. J.
Ware, W. T.

BEGONIAS.

MacLeod, J. F.
Chapman, A.
Odell, J. W.

FRUIT AND VEGETABLES.

Challis, T., V.M.H.
Bunyard, G., V.M.H.
Poupart, W.
Rollit, Sir Albert K., LL.D.

GROUPS IN THE OPEN AIR.

Crump, W., V.M.H.
Fielder, C. R., V.M.H.
Thomson, D. W.

HARDY HERBACEOUS PLANTS.

Groups on the Ground :—

Lynch, R. Irwin, V.M.H.
Beckett, E., V.M.H.
Cheal, Joseph

Table Groups :—

Boscawen, Rev. A. T.
Paul, Geo., V.M.H.
Hales, W.
Veitch, P. C. M.
Notcutt, R. C.
Turner, T. W.

ROCK AND ALPINE GARDENS.

Outside :—

Bowles, E. A., M.A.
Grandfield, J.
Knowles, P. O.

In Tent, and Farrer Cup :—

Bilney, W. A., J.P.
Clutton Brock, A.
Crisp, Bernard

FOLIAGE PLANTS.

Bain, W.
Hudson, J., V.M.H.
Baker, W. G.

OTHER FLOWERING PLANTS.

Howe, W.
Reynolds, G.

MISCELLANEOUS.

Davis, J.
Dixon, C.

HORTICULTURAL SUNDRIES.

To Exhibits :—

Hooper, H.
Pearson, A. H., J.P.
Boscawen, Hon. John

To Subjects :—

Chittenden, F. J., F.L.S.
White, Edward
Wilks, Rev. W., V.M.H.

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Floral and Orchid Committees will be found in their respective Reports.

Gold Medal.

Lieut.-Col. Sir George Holford, K.C.V.O., C.I.E., Tetbury (gr. Mr. H. G. Alexander), for Orchids.

The Hon. Vicary Gibbs, Elstree (gr. Mr. E. Beckett, V.M.H.), for vegetables.

Messrs. Blackmore & Langdon, Twerton-on-Avon, for Begonias.

Messrs. Frank Cant, Colchester, for Roses.

Messrs. Jas. Carter, Raynes Park, S.W., for flowering plants and vegetables.

Messrs. Charlesworth, Haywards Heath, for Orchids.

Messrs W. Cutbush, Highgate, N., for Carnations and Roses.

Messrs. Cuthbert, Southgate, N., for Azaleas.

Messrs. Alex. Dickson, Newtownards, for Roses and Tulips.

Messrs. Dobbie, Edinburgh, for Sweet Peas, Dahlias, and Violas.

Messrs. Engelmann, Saffron Walden, for Carnations.

Messrs. W. Fromow, Chiswick, W., for Japanese Maples.

Messrs. H. B. May, Upper Edmonton, N., for Ferns and flowering plants.

Messrs. W. Paul, Waltham Cross, N., for Roses.

Messrs. J. Piper, Bayswater, W., for Wistarias, Fuchsias, rock garden, and topiary work.

Messrs. Thos. Rivers, Sawbridgeworth, for fruit trees.

Mr. L. R. Russell, Richmond, S.W., for stove and greenhouse plants.

Messrs. F. Sander, St. Albans, for Orchids.

Messrs. Sutton, Reading, for Tulips and florists' flowers.

Messrs. James Veitch, Chelsea, S.W., for stove and greenhouse plants.

Messrs. James Veitch, Chelsea, S.W., for trained fruit trees.

Messrs. James Veitch, Chelsea, S.W., for flowering plants.

Messrs. R. Wallace, Colchester, for rock and formal garden.

Messrs. J. Waterer, Bagshot, for flowering plants.

Mr. J. Wood, Boston Spa, Yorks, for a rock garden.

Farrer Cup.

To Messrs. Bees, Mill Street, Liverpool, for alpine plants.

Davidson Cup for the best Cattleya species in the Show.

Messrs. Charlesworth, Haywards Heath, for *Cattleya Lawrenceana* 'Mary Regina.'

Silver-gilt Cup.

Sir Jeremiah Colman, Bart., Reigate (gr. Mr. J. Collier), for Orchids.

Messrs. J. Backhouse, York, for a rock and water garden.

Messrs. Barr, Covent Garden, for a rock and water garden.

Messrs. Bunyard, Maidstone, for Apples.

Messrs. G. Jackman, Woking, for Clematis and shrubs.

Messrs. J. Piper, Bayswater, W., for a rock and water garden.

Messrs. James Veitch, Chelsea, S.W., for Tulips.

Messrs. R. Wallace, Colchester, for herbaceous flowers.

Large Silver Cup.

Mr. A. F. Dutton, Iver, Bucks, for Carnations.

Messrs. Paul, Cheshunt, for Roses and Azaleas.

Messrs. J. Peed, West Norwood, S.E., for Caladiums and flowering plants.

Messrs. Perry, Enfield, N., for herbaceous flowers and Ferns.

Mr. M. Prichard, Christchurch, for alpine garden and hardy flowers.

Mr. L. R. Russell, Richmond, S.W., for foliage and flowering plants.

Messrs. Sutton, Reading, for vegetables.

Mr. Charles Turner, Slough, for Roses and Carnations.

Messrs. E. Webb, Stourbridge, for Calceolarias and Cinerarias.

Messrs. Young, Hatherley, Cheltenham, for Carnations.

Silver Cup.

The Hon. Vicary Gibbs, Elstree (gr. Mr. E. Beckett, V.M.H.), for Cape Pelargoniums.

Miss M. C. Troyte-Bullock, Yeovil, for Cape Pelargoniums.

Leopold de Rothschild, Esq., Leighton Buzzard (gr. Mr. J. Jennings), for Carnations.

Messrs. Armstrong & Brown, Tunbridge Wells, for Orchids.

Messrs. B. R. Cant, Colchester, for Roses.

Messrs. J. Carter, Raynes Park, S.W., for formal garden.

Messrs. J. Cheal, Crawley, for formal garden, alpine plants and shrubs.

Messrs. W. Cutbush, Highgate, N., for flowering plants.

Messrs. J. Cypher, Cheltenham, for Orchids.

Messrs. J. Hill, Lower Edmonton, N., for Ferns.

Hobbies, Ltd., East Dereham, for Roses.

Messrs. S. Low, Enfield, N., for Orchids.

Messrs. A. & J. McBean, Cooksbridge, for Orchids.

Mr. J. MacDonald, Harpenden, for grasses.

Messrs. G. Mount, Canterbury, for Roses.

Messrs. Pulham, Newman Street, W., for rock garden.

Messrs. T. S. Ware, Feltham, for rock garden.

Standard Cup.

Messrs. G. Beckwith, Hoddesdon, for Roses.

Mrs. B. Borrett, Castlethorpe, for Schizanthus.

Mr. A. J. A. Bruce, Chorlton-cum-Hardy, for Sarracenias.

The Craven Nursery, Clapham, Lancs, for rock garden.

Messrs. Cunningham, Fraser, Edinburgh, for alpine plants.

Mr. E. H. Davidson, Twyford, for Orchids.

Mr. Clarence Elliott, Stevenage, for rock garden.

Mrs. V. A. Litkie, Maidenhead (gr. Mr. W. Hulbert), for Calceolarias.

Dr. John Macwatt, Morelands, Duns, N.B., for Primulas.

Messrs. Mansell & Hatcher, Rawdon, Leeds, for Orchids.

Mr. Reginald Prichard, West Moors, Wimborne, for alpine plants.

Mr. George Prince, Longworth, Berks, for Roses.

Mr. G. Reuthe, Keston, Kent, for rock garden and hardy flowers.

Messrs. Whitelegge & Page, Chislehurst, for rock garden and alpine plants.

Silver-gilt Hogg Medal.

Messrs. Laxton Bros., Bedford, for Strawberries and fruit trees.

Silver-gilt Flora Medal.

Messrs. Barr, Covent Garden, W.C., for Tulips.

Mr. B. E. Bell, Guernsey, for Carnations.

Mr. James Box, Lindfield, for hardy plants.

Mr. H. Burnett, Guernsey, for Carnations.

Messrs. Clark, Dover, for hardy plants.

Messrs. Hassall, Southgate, for Orchids.
Messrs. Hogg & Robertson, Dublin, for Tulips.
Messrs. J. Jefferies, Cirencester, for Tulips.
Messrs. S. Low, Enfield, N., for Carnations.
Messrs. Phillips & Taylor, Bracknell, for hardy flowers.
Messrs. T. S. Ware, Feltham, for Begonias and hardy flowers.

Silver-gilt Knightian Medal.

The King's Acre Nurseries, Hereford, for fruit trees in pots.

Silver-gilt Banksian Medal.

Messrs. Allwood, Hayward's Heath, for Carnations.
Messrs. Artindale, Sheffield, for aquatics and hardy plants.
Messrs. Bakers, Wolverhampton, for alpine and bog plants.
Messrs. Fletcher, Chertsey, for American plants.
Messrs. G. Gibson, Bedale, for herbaceous flowers.
The Guildford Hardy Plant Nursery, Guildford, for rock garden.
Messrs. Kelway, Langport, for herbaceous flowers.
Messrs. R. P. Ker, Liverpool, for Amaryllis.
Mr. C. W. Needham, Hale, Cheshire, for Tulips.
Mr. R. C. Notcutt, Woodbridge, for flowering and foliage plants.
Messrs. Watkins & Simpson, Covent Garden, for annuals.

Silver Flora Medal.

Messrs. R. H. Bath, Wisbech, for Tulips and Carnations.
Mr. C. Blick, Hayes, Kent, for Carnations.
Mr. C. Bourne, Bletchley, for Tulips.
A. P. Brandt, Esq., Bletchingley (gr. J. W. Barks), for Pelargoniums.
The Rev. H. Buckston, Derby (gr. A. Shambrook), for Calceolarias.
The Burton Hardy Plant Co., Christchurch, for rock garden.
Messrs. Cannell, Swanley, for Cannas and Pelargoniums.
Messrs. Carter Page, London Wall, for Dahlias and Violas.
Mr. J. Douglas, Great Bookham, for Carnations.
Mrs. Lloyd Edwards, Llangollen (gr. Mr. Roberts), for Saxifrages.
Mr. S. W. Flory, Twickenham, for Orchids.
Messrs. W. J. Godfrey, Exmouth, for Pelargoniums and Poppies.
Messrs. Gunn, Olton, for Phloxes and alpine plants.
Mr. H. Hemsley, Crawley, for Alpine garden.
Mrs. J. Rolls Hoare, Horsham (gr. J. W. Seden), for Pelargoniums.
The Misses Hopkins, Shepperton, for herbaceous plants.
Messrs. E. W. King, Coggeshall, for Sweet Peas.
Messrs. Robt. Sydenham, Birmingham, for Sweet Peas.
Messrs. Thompson & Charman, Bushey, for hardy plants.
Messrs. R. Veitch, Exeter, for Calceolarias.
The Wargrave Plant Farm, Wargrave, for Tulips and herbaceous plants.
Mr. Carlton White, Bond Street, W., for clipped box and yew trees.

Silver Knightian Medal.

Thatcham Fruit Farm for vegetables.

Silver Banksian Medal.

Messrs. Allen, Norwich, for Roses.
Mr. E. C. Bowell, Cheltenham, for alpine plants.
Mr. H. H. Crane, Highgate, for Violas.
Mr. H. Dixon, Wandsworth, for Orchids.
Messrs. John Forbes, Hawick, for herbaceous plants.
Mr. H. J. Jones, Lewisham, for Pelargoniums.
Messrs. Kent & Brydon, Darlington, for alpine plants and Lilies of the Valley.
Messrs. B. Ladhams, Shirley, Hants., for hardy plants.
Mr. W. Lawrenson, Yarm-on-Tees, for Primulas.
Mr. W. A. Manda, St. Albans, for foliage and flowering plants.
Mr. G. W. Miller, Wisbech, for herbaceous flowers.
Mr. S. Mortimer, Farnham, Surrey, for Stocks and Carnations.
Messrs. Reamsbottom, Geashill, Ireland, for St. Brigid Anemones.
Messrs. W. H. Rogers, Southampton, for shrubs and alpine plants.
Messrs. R. Tucker, Oxford, for rock garden.
Mr. C. F. Waters, Balcombe, for Orchids.
Mr. J. D. Webster, Chichester, for Carnations.
Messrs. W. Wells, Merstham, for Carnations.

Bronze Flora Medal.

Messrs. Barrie & Brown, 39 King William Street, E.C., for herbaceous plants.
Messrs. Brown, Stamford, for Roses and Lilacs.
Mr. T. E. Dawes, Syderstone, for Rhubarb.
Mr. R. de E. Day, Sutton Scotney, for Spanish Irises.
Mr. H. N. Ellison, West Bromwich, for Ferns and Palms.
Stuart Maples, Esq., Stevenage, for alpines and rockwork.

Awards to Exhibits of Horticultural Sundries.

Silver-gilt Flora Medal.

Mrs. Edith Fisher, East Molesey, for water-colour drawing of gardens.

Silver-gilt Banksian Medal.

Messrs. Jas. Carter, Raynes Park, S.W., for seed-testing experiments.
Castles Shipbreaking Co., Millbank, S.W., for garden furniture.
Messrs. Drew, Clark, Leyton, for diamond extension ladders.
Messrs. Sutton, Reading, for botanical and scientific exhibits.
Messrs. W. Wood, Wood Green, N., for garden houses and pergola.

Silver Banksian Medal.

The Acme Patent Ladder Co., Earlsfield, for ladders and barrows.
Miss E. A. Adie, 9 Brechin Place, S.W., for water-colour paintings.

Messrs. Benton & Stone, Birmingham, for syringes.

Messrs. Cooper Pegler, Christopher Street, E.C., for spraying machines.

Messrs. T. Crowther, Fulham, for iron gates, stone seats, &c.

The Dryad Works, Leicester, for Dryad cane furniture.

The En-Tout-Cas Co., Leicester, for garden seats and trellis work.

The Four Oaks Spraying Machine Co., Sutton Coldfield, for spraying machines.

Messrs. A. W. Gamage, Holborn, E.C., for garden houses, tents, &c.

Messrs. T. Green, Southwark Street, S.E., for lawn mowers and rollers.

Messrs. H. Hartjen, 35 Noble Street, E.C., for spraying machines.

Messrs. Headley, Bishopsgate, E.C., for garden books and pictures.

Messrs. J. H. Heathman, Parson's Green, S.W., for ladders, hose, &c.

Messrs. Hughes Bolckow, Blyth, for teak-wood garden furniture.

Messrs. C. P. Kinnell, Southwark Street, S.E., for heating apparatus and boilers.

Messrs. Liberty, Regent Street, W., for summer-houses and garden furniture.

Messrs. Maggs, Clifton, for teak garden seats, folding chairs and tents.

The Patent Safety Ladder Co., Peterborough, for extension ladders.

The Potter's Arts Guild, Guildford, for terra-cotta garden furniture.

Messrs. Pulham, Newman Street, W., for paved garden, fountain, &c.

Messrs. Purser, Hatton Garden, E.C., for spraying apparatus.

Messrs. D. Roberts, Tottenham, N., for tubs for shrubs.

Messrs. W. Duncan Tucker, Tottenham, N., for greenhouses and boilers.

The United Brass-Founders and Engineers Co., Manchester, for spraying machines.

Messrs. R. Wallace, Colchester, for garden plans.

Messrs. Watkins & McCombie, 19 Paternoster Row, E.C., for horticultural illustrations.

Messrs. J. P. White & Sons, Bedford, for garden furniture.

Bronze Banksian Medal.

Messrs. Barr, Covent Garden, W.C., for garden requisites.

Messrs. Blake & Mackenzie, Liverpool, for flower-pots and seed testers.

The Economic Fencing Co., Billiter House, E.C., for wood fencing, &c.

Messrs. Fenlon, Tudor Street, E.C., for new hot-water boilers.

The Hardy Patent Pick Co., Sheffield, for garden forks and spades.

Mr. Robert Hughes, Potter's Bar, for water-colour drawings of gardens.

The Leyton Timber Co., Deptford, for rustic garden furniture.

The London, Provincial, and Export Co., Wandsworth, S.W., for garden furniture.

Fig. 142. The R.H.S. Summer Show at Gore House, Kensington, May 16, 1855.
[Reduced from *The Illustrated London News* of May 19, 1855.]

[To face p. c.

Mr. John Pinches, Camberwell, S.E., for "Acme" garden labels.
The Selborne Society, Hanwell, W., for bird-nesting boxes.
Messrs. R. Sydenham, Birmingham, for rustic table decorations.
Messrs. T. Syer, 45 Wilson Street, E.C., for garden furniture.
Messrs. Vipan & Headly, Leicester, for garden seats.

GENERAL MEETING.

June 3, 1913.

Mr. Joseph Cheal in the Chair.

Fellows elected (119).—Miss G. Adams, Mrs. W. Adamson, T. F. Agar, Capt. F. H. Alexander, Mrs. W. Anderson, Mrs. Anson, Mrs. R. H. Attenborough, H. E. Baker, J. S. Baker, Mrs. G. Barnes, Mrs. J. N. Beach, R. H. Beauchamp, Mrs. R. L. Beausire, Mrs. Berry, Miss E. D. Bibby, Miss W. Bompas, A. G. Bousfield, L. N. Boustead, Mrs. F. Brewster, F. E. T. Briscoe, Hon. Mrs. A. G. Calthorpe, Mrs. Frank Capper, Major J. T. Carpenter-Garnier, M. Carrington-Sykes, M.D., Miss Casey, Miss H. F. Cholmeley, Mrs. C. Fell Clark, Mrs. D. Clark, R. M. Cocks, Miss A. B. Cooper, Mrs. J. D. Cormack, Mrs. F. J. G. Cross, F. N. Davidson, R. Davies, J.P., A. Dolton, Mrs. E. Durrant, Miss J. C. Eaton, Miss Folkes, G. Fowler, Mrs. G. Fowler, Hon. Mrs. A. Fraser, Rev. J. M. Freshfield, Sir Bampfylde Fuller, K.C.S.I., C.I.E., C. Godfrey, M.V.O., M.A., H. P. Gray, Mrs. H. E. Greenstreet, F. Hadden, Mrs. W. Hadley, Lady Harcourt, Mrs. Hargreave, C. Hart, H. H. Hart, M. Hart, Sir Arthur J. Herbert, G.C.V.O., Mrs. Hickson, Mrs. T. E. Hodgkin, L. H. R. Hollebone, Col. E. J. Hollway, Mrs. J. A. Hood, C. R. Jacomb, Mrs. E. Johnson, Mrs. W. L. Johnson, Mrs. H. G. Johnston, Miss E. C. Kearton, Mrs. R. A. Ker, Mrs. V. M. Kirke, Miss E. Lee-Warner, Mrs. D. A. Lemon, C. Lewisohn, Capt. Hon. M. Lyon, F. McDougall, W. C. Mansell, Rev. H. J. Marshall, Miss J. Maw, Miss Maynard, Mrs. Mayne, Mrs. J. E. Mills, Dr. H. R. Mosse, Hon. Mrs. A. J. Mulholland, Mrs. Murray-Johnson, Miss E. A. Nurse, Miss F. A. Nurse, Miss E. M. Paice, F. L. Paine, Mrs. H. Papillon, J. Pigg, G. A. Price, F. W. Procter, J.P., Miss A. T. Procter, H. E. Richardson, Mrs. C. Ridley, T. H. Robertson, Lady Ryan, Mrs. A. C. Salter, F. G. Sargood, Miss S. Sassoon, Rev. L. Savill, Mrs. A. Sconce, Miss A. M. Smallwood, H. Smith, R. R. C. Sperling, Miss S. B. Steel, G. Stehn, C. E. Taylor, Mrs. C. G. Toller, M. Tosetti, F. Trippear, F. M. Voules, Mrs. T. Wade, F. W. Walker, H. F. Waring, C. W. Wedekind, Miss J. Welch, F. White, Mrs. H. Williams, Hon. Mrs. Guy Wilson, Hon. Mrs. R. Wilson, H. R. Yerburgh-Bonsey, Lieut.-Col. J. A. C. Younger.

Fellow resident abroad (1).—R. D. Fordham (India).

Associate (1).—A. B. Mensah.

A lecture on the "Wild Flowers of Mahabaleshwar, India," was given by Prof. O. V. Muller, M.A., I.E.S., and illustrated by paintings by Mrs. Muller.

GENERAL MEETING.

JUNE 17, 1913.

Sir FREDERICK W. MOORE, M.A., F.L.S., V.M.H., in the Chair.

Fellows elected (73).—D. H. Anderson, The Marchioness of Anglesey, C. H. Bailey, Mrs. Baird, Mrs. E. Baker, Mrs. K. E. Bentley, G. P. Berry, J. K. Birch, Hon. Stuart P. Bouverie, Mrs. W. J. Brooke, Col. C. B. Brownlow, Mrs. Cadogan, J. Carmichael, J.P., Mrs. J. Carmichael, A. Carpmael, J. A. Castle, Miss Chippindale, P. Cross, J. H. Crowley, A. Curtis, C. N. Daniel, Mrs. H. Dent, Miss B. de Pledge, Miss K. D. Digby, Mrs. E. G. Edgar, Mrs. M. H. Egan, Mrs. B. Garfit, Hon. Mrs. Gerald Gibbs, Miss C. M. Greaves, A. F. Haines, Mrs. R. G. Halstead, Mrs. Heatley, R. Hendry, Mrs. B. Heywood, Mrs. J. G. Hodgson, Mrs. H. Homan, Mrs. W. M. Hornby, Lady Hely-Hutchinson, Mrs. L. H. Kiek, Mrs. H. E. Kirby, The Countess of Kinnoull, George Kitchin, Mrs. A. Landau, Miss A. Large, O. T. Leighton, Capt. G. R. B. Moody, Mrs. Hopkin Morris, Mrs. R. Scott Morton, Mrs. H. Nicoll, Mrs. Noble, Mrs. M. Ord-Mackenzie, W. C. O'Sullivan, W. W. Otter, Mrs. W. H. Peech, W. E. Pimm, Mrs. J. Purkis, C. R. Rivington, J.P., Miss R. S. Rogers, Sir Percy Sanderson, K.C.M.G., Mrs. W. M. Scott, Miss K. M. Sharpe, B. Smith, Mrs. E. Smith, A. H. B. Sperling, Mrs. Stevenson, Mrs. A. Sykes, F. Treherne Thomas, Mrs. A. R. Vincent, J. G. Watson, Miss H. S. Wilkinson, Mrs. Kirkaldy Willis, C. H. Wise, M. Wright.

Fellow resident abroad (1).—Cecil Pragnell (Victoria, B.C.).

A lecture on "The Evolution of Plants, and the Directivity of Life as shown by Vegetative Structures" was given by the Rev. Prof. G. Henslow, M.A., V.M.H. (see p. 338).

HOLLAND PARK SHOW.

JULY 1, 2, AND 3, 1913.

JUDGES.

ORCHIDS.

Chapman, H. J.
Crawshay, de Barri
Shill, J. E.

ROSES.

Jefferies, W. J.
Mease, W.
Page Roberts, Rev. F.
Piper, T. W.

CARNATIONS.

Jennings, J.
MacLeod, J. F.
Turner, Arthur

BEGONIAS (TUBEROUS).

Blick, C.
Chapman, A.
Odell, J. W.

SWEET PEAS.

Bates, W.
Gordon, Geo., V.M.H.
Watkins, A.

FRUIT AND VEGETABLES.

Challis, T., V.M.H.
Poupart, W.
Rollit, Sir Albert K., LL.D.
Thomas, O., V.M.H.

HARDY HERBACEOUS PLANTS AND GORDON LENNOX CUP.

Beckett, E., V.M.H.
Cheal, J.
Hales, W.
Lynch, R. Irwin, M.A., V.M.H.
Notcutt, R. C.
Paul, G., V.M.H.
Shea, C. E.

ROCK, ALPINE, AND WATER GARDENS.

Bedford, A.
Bilney, W. A., J.P.
Bowles, E. A.
Divers, W. H., V.M.H.

FOLIAGE PLANTS.

Bain, W.
Baker, W. G.
Hudson, J., V.M.H.
Wythes, G., V.M.H.

OTHER FLOWERING PLANTS.

Howe, W.
Reynolds, G.
Turner, T. W.

PLANTS NOT INCLUDED IN ABOVE.

Bean, W. J.
Davis, J.

HORTICULTURAL SUNDRIES.

Allan, A. R.
Basham, J.
Markham, H.
Woodward, G.

SHERWOOD AND WIGAN CUPS FOR ROSES.

Dixon, C.
Pearson, A. H., V.M.H.
Wigan, A. L.

AFFILIATED SOCIETIES CHALLENGE CUP FOR HARDY FLOWERS.

Cuthbertson, W.
Green, J.
Pearson, C. E.

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Floral and Orchid Committees will be found in their respective reports.

Coronation Cup (for most meritorious Exhibit in the Show).

Messrs. F. Sander, St. Albans, for Orchids.

Gold Medal.

Lord Llangattock, Monmouth (gr. Mr. T. Coomber), for Pine-apples.

Sir Randolf Baker, Bart., Blandford (gr. Mr. A. E. Usher), for Sweet Peas.

The Hon. Vicary Gibbs, Elstree (gr. Mr. E. Beckett, V.M.H.), for vegetables.

Messrs. Blackmore & Langdon, Bath, for Begonias.

Messrs. Charlesworth, Haywards Heath, for Orchids.

Messrs. Dobbie, Edinburgh, for Sweet Peas.

Messrs. H. B. May, Edmonton, N., for exotic ferns.

Messrs. Paul, Cheshunt, for Roses.

Messrs. W. Paul, Waltham Cross, for Roses.

Messrs. Sander, St. Albans, for Orchids.
Messrs. Sutton, Reading, for Sweet Peas.
Messrs. J. Veitch, Chelsea, for fruit trees in pots.
Messrs. J. Veitch, Chelsea, for Chinese plants.
Messrs. R. Wallace, Colchester, for ornamental water garden.

Silver-gilt Cup.

Mr. James Box, Lindfield, for water garden, Sweet Peas, &c.
Mr. L. R. Russell, Richmond, S.W., for stove plants and Ivies.

Large Silver Cup.

Sir Jeremiah Colman, Bart., Reigate (gr. Mr. J. Collier), for Orchids.
Messrs. G. Bunyard, Maidstone, for Roses and hardy flowers.
Messrs. W. Cutbush, Highgate, for Carnations and Roses.
Mr. Chas. Turner, Slough, for Roses.

Silver Cup.

Messrs. Barr, Covent Garden, W.C., for flowering plants.
Messrs. Brown, Stamford, for Roses.
Messrs. J. Carter, Raynes Park, S.W., for water garden.
Mr. A. Ll. Gwillim, Eltham, for Begonias.
Messrs. S. Low, Enfield, N., for Roses and Carnations.
Messrs. Mansell & Hatcher, Rawdon, for Orchids.
Messrs. J. Piper, Bayswater, W., for formal garden.
Mr. M. Prichard, Christchurch, for hardy flowers.
Messrs. James Veitch, Chelsea, for flowering plants.

Standard Cup.

J. S. Arkwright, Esq., Presteign, for *Lychnis Arkwrightii.*
Messrs. Fromow, Chiswick, W., for Japanese Maples.
Messrs. G. Jackman, Woking, for Roses and Clematis.
Messrs. S. Low, Enfield, for Orchids.
Messrs. J. Peed, West Norwood, S.E., for Caladiums.
Mr. Amos Perry, Enfield, for herbaceous plants.

Silver-gilt Hogg Medal.

S. Heilbut, Esq., Maidenhead (gr. Mr. Camp), for pot fruit trees.

Silver-gilt Knightian Medal.

Messrs. Laxton, Bedford, for Strawberries.

Silver-gilt Flora Medal.

W. M. Gott, Esq., Par Station (gr. Mr. G. Hillman), for Carnations.
Messrs. Bakers, Codsall, Staffs, for alpine plants.
Mr. B. E. Bell, Guernsey, for Carnations.
Mr. H. Burnett, Guernsey, for Carnations.
Messrs. B. R. Cant, Colchester, for Roses.
Messrs. F. Cant, Colchester, for Roses.
Messrs. J. Cheal, Crawley, for ornamental garden.
Messrs. Clark, Dover, for hardy flowers.
Mr. C. Engelmann, Saffron Walden, for Carnations.
Mr. S. W. Flory, Twickenham, for Orchids.

Messrs. Hobbies, E. Dereham, for Roses.
Messrs. J. K. King, Coggeshall, for Sweet Peas.

Silver-gilt Banksian Medal.

Lord Burnham, Beaconsfield (gr. Mr. G. Johnson), for Carnations.
Mary, Countess of Ilchester, Holland House, W. (gr. Mr. C. Dixon), for Sempervivums and Saxifrages.
Messrs. Bees, Liverpool, for new Chinese Primulas.
Messrs. Bide, Farnham, for Sweet Peas.
Messrs. J. Forbes, Hawick, N.B., for Phloxes and Pentstemons.
Messrs. Gunn, Olton, for Phloxes.
Messrs. Harkness, Bedale, for hardy flowers.
Messrs. H. J. Jones, Lewisham, for Phloxes and Campanulas.
Messrs. E. W. King, Coggeshall, for Sweet Peas.
Mr. Geo. Prince, Oxford, for Roses.
Mr. G. Reuthe, Keston, for hardy plants and shrubs.
Messrs. F. Smith, Woodbridge, for hardy flowers.
Messrs. G. Stark, Great Ryburgh, for Sweet Peas.
Messrs. T. S. Ware, Feltham, for Begonias and alpine plants.

Silver Flora Medal.

Rev. L. C. Chalmers-Hunt, Letchworth, for vegetables and Roses.
Messrs. Cuthbert, Southgate, for *Humea elegans.*
Mr. H. Dixon, Wandsworth, S.W., for Orchids.
Mr. J. Douglas, Great Bookham, for border Carnations.
Messrs. W. Fells, Hitchin, for herbaceous plants.
The Guildford Hardy Plant Nursery, for herbaceous plants.
Mr. T. R. Hayes, Keswick, for heaths and alpine plants.
Mr. H. Hemsley, Crawley, for Antirrhinums, &c.
Mr. F. Lilley, Guernsey, for Gladioli and Sparaxis.
Mr. J. Mattock, Oxford, for Roses.
Mr. R. C. Notcutt, Woodbridge, for Roses.
Messrs. Phillips & Taylor, Bracknell, for water garden.
Mr. R. Prichard, West Moors, for hardy flowers.
Messrs. R. Sydenham, Birmingham, for Sweet Peas.
Messrs. Thompson & Chapman, Bushey, for hardy plants.
Messrs. J. Veitch, Chelsea, for Orchids.
Messrs. Whitelegge & Page, Chislehurst, for Sweet Peas.

Silver Banksian Medal.

Lady Northcliffe, Guildford (gr Mr. J. Goatley), for *Crassula coccinea.*
Messrs. R. H. Bath, Wisbech, for Roses and herbaceous plants.
Messrs. G. Bolton, Buntingford, for Roses.
Messrs. Bull, Frome, for hardy flowers.
Messrs. Carter Page, London Wall, E.C., for Dahlias and Violas.
Mr. H. H. Crane, Highgate, for Violas and Violettas.
Mr. Walter Easlea, Eastwood, Essex, for Roses.
Mr. Clarence Elliott, Stevenage, for alpine plants.
Messrs. G. Gibson, Bedale, for hardy plants.

Messrs. Godfrey, Exmouth, for Pelargoniums.
Messrs. Kelway, Langport, for Delphiniums.
Mr. E. V. Low, Haywards Heath, for Orchids.
Mr. James MacDonald, Harpenden, for Grasses.
Mr. G. W. Miller, Wisbech, for herbaceous plants.
Messrs. Morse, Woodbridge, for Roses.
Mr. W. H. Page, Hampton, for flowering plants.
The Wargrave Plant Farm, Wargrave, for hardy flowers.
Messrs. Watkins & Simpson, London, W.C., for Antirrhinums.
Mr. J. D. Webster, Chichester, for Sweet Peas.
Mr. Carlton White, 53 New Bond Street, W., for clipped trees.

Certificate of Appreciation.

Mr. H. Hemsley, Crawley, for work in raising new Antirrhinums.

Awards to Exhibits of Horticultural Sundries.

Silver-gilt Banksian Medal.

Messrs. T. Crowther, Fulham, for ornamental stone and iron work.
Messrs. Gamage, Holborn, for garden tents and chairs.

Silver Banksian Medal.

Messrs. Abbott Bros., Southall, for Osterley table trays, &c.
Messrs. Benton & Stone, Birmingham, for spraying machines.
Messrs. Castles, Millbank, Westminster, for garden furniture.
Messrs. Liberty, Regent Street, W., for Japanese garden ornaments.

Bronze Banksian Medal.

Messrs. Barr, Covent Garden, for tools and implements.
Messrs. Jos. Bentley, Barrow-on-Humber, for horticultural chemicals.
Mr. John Bradley, Duffield, Derby, for Bunty tea-house.
Miss Edith Fisher, East Molesey, for water-colour drawings.
The Four Oaks Spraying Machines, Sutton Coldfield, for spraying machines.
Messrs. Heathman, Parson's Green, S.W., for ladders, hose, &c.
Mr. Robert Hughes, Potter's Bar, for water-colour drawings.
Miss Mitchell, Meath Home, Godalming, for garden baskets.
Mr. John Pinches, Camberwell, S.E., for labels and exhibition boxes.
Messrs. W. Voss, Millwall, E., for insecticides.
Messrs. E. A. White, Paddock Wood, for insecticides and sprayers.

DEPUTATION TO BRISTOL.

July 2, 1913.

On Wednesday, July 2, at the invitation of the Council of the Royal Agricultural Society, a Deputation consisting of the President of the Society, Field Marshal the Right Hon. the Lord Grenfell, G.C.B., G.C.M.G., accompanied by Baron Schröder, Sir Harry J. Veitch,

V.M.H., Mr. H. B. May, V.M.H., and the Rev. W. Wilks, M.A., V.M.H., visited the Flower Show held in connexion with the Royal Agricultural Show at Bristol.

On arriving at the station the Deputation found its way to the somewhat distant Show ground on Clifton Down and were welcomed at the entrance by Mr. McRow, the Secretary of the R.A.S., and directed by him to the still distant flower tents where the Hon. John Boscawen was in readiness to escort the Deputation round all the Exhibits. The Show proved to be a really magnificent one, and the Deputation appreciated it very highly, as may be seen by the number and grade of the awards which they made.

After finishing their work the Deputation were very handsomely entertained at luncheon by the Right Hon. Lord Northbrook, Sir Gilbert Greenall, Bart., and other members of the Council of the Royal Agricultural Society. The Deputation returned to London the same evening after a very strenuous day—the heat of the sun on Clifton Down having been somewhat excessive.

Gold Medal.

Sir George Holford, K.C.V.O., C.I.E., for Orchids.

Silver-gilt Cup.

Sir George Holford, K.C.V.O., C.I.E., for Amaryllis.
Messrs. Blackmore & Langdon, for Begonias.
Duke of Portland, for Fruits.
Messrs. May, for Ferns.

Large Silver Cup.

Messrs. Cypher, for group of plants.
Kingsacre Nurseries, for fruit trees in pots.
Messrs. House, for Alpines in pans.
Messrs. Sutton, for fruit, flowers, and vegetables.

Silver Cup.

Mr. Holmes, for group of plants.
Messrs. Harkness, for herbaceous.
Messrs. Low, for mixed group.

Standard Cup.

Messrs. Mallett, for rock plants.
Messrs. Carter, for vegetables.
Messrs. Gibson, for herbaceous.
Messrs. Jefferies, for coniferous plants.
Messrs. Dicksons, for Roses.
Messrs. Godfrey, for Pelargoniums, &c.
Mr. Wall, for Carnations.
Messrs. Armstrong & Brown, for Orchids.
Mr. Hill, for Sweet Peas.

Silver-gilt Flora Medal.

Messrs. Dobbie, for Sweet Peas.
Mr. Adams, for Roses.
Messrs. Young, for Carnations.

Silver-gilt Banksian Medal.

Messrs. E. W. King, for Sweet Peas.
Mr. Jarman, for Roses and Sweet Peas.
Mr. W. J. Unwin, for Sweet Peas.
Messrs. Cooling, for Roses.

Silver Knightian Medal.

Messrs. Toogood, for vegetables.

Silver Flora Medal.

Messrs. Artindale, for water garden.
Messrs. Walters, for Roses.
Messrs. Kelway, for Delphiniums.
Messrs. R. Veitch, for miscellaneous plants.
Mr. Ellison, for Ferns.
Mr. Dutton, for Carnations.
Messrs. Garaway, for Eucharis, &c.

Silver Banksian Medal.

Colonel Batten, for Orchids.
Messrs. Keeling, for Orchids.
Mr. Slade, for Pelargoniums.
Mr. Parker, for Roses.
Miss Hemus, for Sweet Peas.

GENERAL MEETING.

July 15, 1913.

Lieut.-Col. Sir David Prain, C.I.E., F.R.S., V.M.H., in the Chair.

Fellows elected (109).—Dr. A. Adams, Mrs. F. G. Arkwright, Lady Baring, W. C. Barnes, G. B. Bassett, Mrs. G. A. Battcock, Mrs. H. Becker, Mrs. Bergne-Coupland, J. H. Birchenough, C.M.G., Miss A. Blenkiron, Mrs. H. F. Blyth, S. C. Boulter, R. Bright, C. Brook, Mrs. J. G. Butcher, H. B. Campbell, J. Clark, Mrs. J. J. Clarke, Mrs. M. Clutterbuck, R. Cooke, Miss A. M. L. Cox, B. F. Crewdson, W. R. Crooke, Mrs. Dallas, Mrs. Danvers, Miss M. Darbyshire, Mrs. Sinclair Davidson, Mrs. H. F. Dickins, Mrs. Ducat, Dr. G. J. Eady, C. W. Farwell, R. C. Flint, J. Forrest, Mrs. Rawdon Forrest, J. Foster, Miss I. M. Gabriel, A. Gibson, Mrs. Gifford, Hon. Eveline Godley, E. A. Goulding, Mrs. H. Graystone, B. R. Hawker, Miss S. Henry, J. E. Holdsworth, A. R. Hope, Miss F. M. Hornby, A. H. Jackson, C. H. Jackson, Mrs. Judges, Mrs. Myles Kennedy, P. T. Kenway, Mrs. H. T. Ker, Florence Lady Lacon, Lady Lawrence, Mrs. J. Leeming,

J. G. Maclean, Mrs. Maconochie, H. M. Matheson, Mrs. A. E. Mills, Rev. J. Moulson, Mrs. H. Nevill, Rev. G. E. Newson, J. L. Nissen, H. Nixon, Mrs. L. Norton, F. B. Oldfield, J. H. Oram, Mrs. G. Page, E. J. Praill, J. W. Pyman, H. F. Raley, F. E. Reiss, T. W. Riakes, H. Riley, Miss M. E. Robinson, Miss A. T. Roodhouse, Mrs. H. E. Roxby, Miss A. M. Sanders, S. J. Sandle, Miss B. Searle, Rev. R. T. Seddon, Col. C. N. Simpson, Ven. Archdeacon Sinclair, W. R. Smith, C.B., A. J. Snell, Mrs. Sonnenthal, A. H. Stenning, L. C. Stewart, G. B. Stuart, G. T. Symons, Mrs. F. R. Tebbs, Mrs. Telfer, Dr. H. S. Thomas, Miss M. Thomas, Mrs. F. R. Townend, Hon. Mrs. Cosby Trench, F. V. Turpin, H. C. Walrond, R. H. Walsh, Mrs. B. Weekes, Howell J. Williams, J.P., Mrs. Francis Williams, Mrs. Howell Williams, Mrs. W. O. Willis, John Wood, Mrs. J. Stuart Wortley, Mrs. W. Logan Wright, Alex. Young, Mrs. Young.

Fellows resident abroad (5).—J. C. Chunder (Calcutta), W. W. Johnstone (Mussoorie), Mrs. W. Montgomery (New York), Charles Parker (New York), A. E. V. Richardson, M.A., B.Sc. (Melbourne).

Associate (1).—John G. Bacon.

Society affiliated (1).—The Lion (Halstead) Horticultural Society.

The ninth MASTERS MEMORIAL LECTURE, on "Some Factors in the Prevention of Disease in Plants," was given by Prof. R. H. Biffen, M.A. (see p. 313).

DEPUTATION TO BIRMINGHAM.

JULY 18, 1913.

A DEPUTATION consisting of Sir Harry Veitch, V.M.H., Mr. H. B. May, V.M.H., Mr. George Bunyard, V.M.H., and the Assistant Secretary, visited the Annual Flower Show of the Birmingham Horticultural Society on July 18.

On the previous evening they were the guests of the Right Hon. the Lord Mayor of Birmingham at a complimentary dinner at the Queen's Hotel. It was a disappointment that the Lord Mayor himself was unable to be present owing to indisposition, but Alderman W. F. Bowater, J.P., was his deputy, and a very warm welcome he gave. There were also present at the dinner—Sir George Kenrick, Mr. W. G. Griffith (Deputy President of the Society), Dr. F. H. Maberly (Vice-Chairman), Councillor Norman Chamberlain, Councillor Wm. Cadbury, and Mr. E. H. Weaver (Chairman), Mr. Silver (Treasurer), Mr. Brace, Mr. J. Homer, and the Superintendent of the Birmingham Public Parks —Mr. Wm. Morter. The dinner passed very pleasantly, and afforded helpful intercourse relative to matters concerning Horticultural Society work.

The floral exhibits were staged in six large tents at Handsworth Park, and beautiful and praiseworthy many of them were, the list of awards following testifying to the deputation's appreciation of them.

The groups of stove and greenhouse plants were particularly attractive, whilst some of the specimen plants showed excellent culture. The show was opened by Lord and Lady Calthorpe; afterwards the Deputation were guests at the official luncheon, when Sir Harry Veitch responded to the toast of "The Royal Horticultural Society."

The Deputation having made its awards, a tour by motor-car of the public parks was made with Mr. Morter, the Superintendent. The tour included the beautiful Cannon Hill Park and Victoria Park, and the Deputation were much pleased with all they saw. The city of Birmingham is to be congratulated on the great extension of its public parks during the last ten years—no better development could possibly receive the attention of the Local Authority in such a big industrial city. Mr. Morter is to be congratulated on the work he is doing, and the Deputation tender to him their thanks for the interest he added to the visit. The kindness of Mr. Griffith is particularly appreciated, for, from first to last, he devoted himself to the comfort and enjoyment of the Deputation, including the placing of his car at their disposal during their stay.

The Birmingham Society is evidently doing a very good work for horticulture within the region of Birmingham, and the Deputation cordially hope that ere long the Show Committee's wish to bring their Annual Show up to the highest standard set by a few other provincial shows of established reputation will be realized. The Society is worthy of substantial financial support locally, and here lies its greatest need at the present moment. No Society, and particularly a Horticultural Society, can flourish except the money be forthcoming for the proper conduct of the work in hand, and money cannot be devoted to a better purpose for the enjoyment, health, and therefore wealth of the community than when applied to the beautifying of our gardens.

The following awards were made at the Show:—

Gold Medal.

To Messrs. J. Cypher, Cheltenham, for stove and greenhouse plants.

To Messrs. Sutton, Reading, for flowers and vegetables.

Silver Cup.

To His Grace the Duke of Westminster (gardener, Mr. N. F. Barnes), Eaton Hall, for fruit.

To Sir George Kenrick (gardener, Mr. J. V. MacDonald), Birmingham, for a group of plants.

To J. Arthur Kenrick, Esq. (gardener, Mr. Cryer), for a group of plants.

To Messrs. Gunn, Olton, for Roses.

To Mr. F. R. Hayes, Keswick, for a rock and water garden.

Silver-gilt Knightian Medal.

To Messrs. Webb, Stourbridge, for vegetables, &c.

Silver-gilt Flora Medal.

To Messrs Cypher, Cheltenham, for 12 stove and greenhouse plants.

To Messrs. E. W. King, Coggeshall, for Sweet Peas.

To Messrs. Herd, Penrith, for Sweet Peas.

Silver-gilt Banksian Medal.

To Mr. W. R. Manning, for a group of plants.

To H. C. Pinsent, Esq. (gardener, Mr. Corbett), for a group of plants.

Silver Knightian Medal.

To H. Andrews, Esq. (gardener, Mr. J. R. Tooley), for a collection of fruit.

Silver Flora Medal.

To Messrs. H. J. Jones, Lewisham, for Phloxes.

To Messrs. Piper, Bayswater, for water garden and herbaceous plants.

To Mr. J. Mattock, Oxford, for Roses.

To Messrs. F. Smith, Woodbridge, for herbaceous group.

To Messrs. T. S. Ware, Feltham, for Begonias.

To the Clury Nurseries, Langley, for Carnations.

To Mr. K. Burnett, Guernsey, for Carnations.

To Mr. A. F. Dutton, Iver, for Carnations.

To Messrs. Gunn, Olton, for rock garden and Phloxes.

Silver Banksian Medal.

To Messrs. Hewitt, Birmingham, for herbaceous.

To Mr. N. Ellison, West Bromwich, for Ferns.

To Mr. Thos. Howse, Handsworth, for a display of garden produce.

Bronze Banksian Medal.

To Mr. F. Hudman, Hamsted, for a display of garden produce.

To W. W. Emms, Harborne, for a collection of Wild Flowers.

To Leslie Robinson, Lightwood, for a collection of Wild Flowers.

DEPUTATION TO CARDIFF.

July 23, 1913.

A DEPUTATION consisting of the President of the Society, the Right Hon. Lord Grenfell, Field Marshal, Sir Daniel Morris, K.C.M.G., Mr. J. Gurney Fowler (Treasurer), Mr. James Hudson, V.M.H., and the Rev. W. Wilks, M.A., V.M.H. (Secretary), visited the Show of the Cardiff Horticultural Society held on July 23.

The Deputation left London at 3.35 on Tuesday, July 22, and arrived at Llantrisant about 7.30, and at once drove to Talygarn,

where they were most hospitably received and entertained by Mr. Godfrey L. Clark, President of the Cardiff Society, whose beautiful park and garden, filled with a magnificent collection of shrubs and trees, were greatly admired.

The next morning Mr. Clark drove the Deputation into Cardiff, and a very beautiful Show was thoroughly inspected and the undermentioned awards were made.

At the judges' luncheon the Deputation were received as honoured guests, and our President, Lord Grenfell, responded to the toast of the Royal Horticultural Society, which had been proposed by Mr. Godfrey Clark and received with much applause.

The Deputation returned to London in the evening, with the exception of the Secretary, who went to Duffryn to arrange with Mr. Reginald Cory about the trial of Dahlias taking place in his garden. The Secretary spent two delightful days at Duffryn, enjoying the beautiful and very extensive gardens which Mr. Cory has created, and taking note of the vast extent of the Dahlias, numbering between two and three thousand plants, on their trial.

The best thanks of the Deputation are due to Mr. Godfrey Clark for his hospitality so kindly extended to them all; and the Secretary is specially indebted to Mr. and Miss Cory for the delightful time which they gave him.

Gold Medal.

To the King's Acre Nursery, for fruit trees in pots.
To Messrs. Sutton, for fruit and vegetables, Sweet Peas.

Silver Cup.

To the Marquis of Bute, for a group of plants.

Standard Cup.

To Messrs. Cypher, for group of plants.
To Lady Hill, for group of plants.
To Messrs. House, for rock plants in pans, Sweet Peas, &c.

Silver-gilt Lindley Medal.

To the Marquis of Bute, for an Educational Exhibit of Forestry.

Silver-gilt Flora Medal.

To Mr. Mattock, for Roses.
To Mr. Crossling, for Roses.
To Messrs. Young, for Carnations.
To Messrs. Blackmore & Langdon, for Begonias.
To Mr. Vernon Hill, for Sweet Peas, herbaceous, and rock plants.
To Messrs. Artindale, for Violas and Sweet Peas.

Silver-gilt Banksian Medal.

To Messrs. H. B. May, for Ferns.
To Messrs. W. & C. Bull, for hardy flowers.
To Mr. A. F. Dutton, for Carnations.

Silver Knightian Medal.

To Mrs. Rees Jones, for vegetables.
To the Marquis of Northampton, for vegetables.

Silver Flora Medal.

To Mr. R. T. Went, for herbaceous flowers.
To Mr. C. Wall, for Carnations.
To Captain Lubbock, for Sweet Peas.

Silver Banksian Medal.

To the Duchess of Somerset, for Carnations.
To Mr. Pitcher, for Begonias.
To Lady Hill, for Fuchsias.
To Mr. John Oxenham, for Pelargoniums.
To Mr. E. H. Ebsworth, for Muscat Grapes.

Bronze Knightian Medal.

To Mr. David Adams, for vegetables.
To Mr. E. E. Hole, for vegetables.
To Mr. R. Smith, for vegetables.

Bronze Banksian Medal.

To Mr. E. Harvey, for annuals.
To Mr. W. Howe, for wild flowers.
To Mr. I. Mullett, for wild flowers.
To Miriam P. Duffield, for wild flowers.
To Mr. Stanley Mellings, for wild flowers.

GENERAL MEETING.

JULY 29, 1913.

Lieut.-Col. Sir DAVID PRAIN, C.I.E., F.R.S., V.M.H., in the Chair.

Fellows elected (35).—The Marquis of Anglesey, E. H. Archer, Mrs. E. Banks, J. T. Burrows, Miss Choate, Mrs. A. W. Churchill, W. W. Clarke, W. Cowe, Hon. Mrs. R. Devereux, T. E. Fright, F. Gillett, P. Good, Mrs. E. S. Handcock, W. T. Harradon, Hon. Mrs. H. Hood, T. C. Huband, E. Jeffreys, A. Johnson, G. D. Lawson, J. W. Lesley, Mrs. J. Lumsden, Miss E. A. Miller, L. C. R. Palmer, H. S. Read, W. Sandover, Mrs. Arthur Saurin, Mrs. Selous, Lieut.-Col. C. H. Smith, V.D., E. P. Smith, R. D. Trotter, Miss F. Vickery, W. Walker, H. Watson, W. N. Watson, S. H. White.

Fellows resident abroad (3).—C. M. Chatterji (Bengal), Mrs. A. P. Luxton (Victoria, B.C.), J. H. Maiden (Sydney, N.S.W.).

The tenth MASTERS MEMORIAL LECTURE, on "Some Factors in the Prevention of Disease in Plants," was given by Prof. R. H. Biffen, M.A. (see p. 313).

GENERAL MEETING.

August 12, 1913.

Mr. George Gordon, V.M.H., in the Chair.

Fellows elected (22).—E. Beresford-Peirse, J. P. Blake, C. A. Burgess, G. W. R. Foster, A. C. M. Fraser, Mrs. Harley, J. W. Heard, G. D. Hogan, W. H. Hollis, Miss M. H. Hughes, Dr. M. M. Hutchinson, Mrs. M. W. Mattinson, Rev. W. C. O'Ferrall, W. Ousely, L. H. Potter, N. W. Priaulx, Mrs. H. Reynolds, L. F. Schuster, A. Vagliano, C. H. Ward, James Williams, W. D. Wiltshire.

Fellow resident abroad (1). — de Walden Houghton (Madras).

Associate (1).—Miss F. Whistler.

A lecture on "Fairy-flies and their Hosts" was given by Mr. Frederick Enock, F.L.S.

GENERAL MEETING.

August 26, 1913.

Mr. W. A. Bilney, J.P., in the Chair.

Fellows elected (11).—G. Cawston, J. J. Dyke, Major A. Greg, W. E. Hoare, Walter Jones, Miss F. B. Lawrence, T. A. Roberts, Miss J. Thomas, C. T. Vessey, J. T. Walker, Mrs. Wilson.

Fellows resident abroad (2).—Mrs. Ira Devonport (New York), E. C. Pratt (Hobart, Tasmania).

A lecture on "Tuberous Begonias" was given by Mr. Chas. F. Langdon, F.R.H.S. (see p. 344).

SCIENTIFIC COMMITTEE.

MAY 14, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and ten members present.

Saxifraga Mertensiana.—Mr. J. Fraser, F.L.S., showed this plant, a native of Western N. America, and remarked upon its position intermediate between two sections of the genus. The plant bore bulbils on the lower part of the inflorescence, and, like *S. cernua*, had its flowers at the tips of the branches of the inflorescence. The flowers are often defective, both the stamens being deformed and the styles absent.

Hen and Chickens Daisies.—Mr. A. Worsley showed inflorescences of the well-known 'hen and chickens' daisy from plants which had appeared in his garden, where none of this form had previously been grown.

Primula × *Bowlesii.*—Mr. Bowles showed flowers and foliage of the hybrid *Primula* × *Bowlesii* (*P. pedemontana* × *P. viscosa*) with specimens of the parents for comparison. Characters of both parents were present in the plant, which had been found two years ago on Mont Cenis (see pp. 123, 227).

Clitoria ternatea and Passiflora foetida.—Lady Theodora Guest sent flowers and foliage of the uncommon *Clitoria ternatea* and of *Passiflora foetida*. The latter grows wild in Ceylon and in many other tropical places, but is probably an escape from cultivation, most of the species of *Passiflora* being native in Brazil.

Orchid Hybrids.—Mr. R. A. Rolfe, A.L.S., exhibited flowers of two interesting hybrid orchids raised by himself at Kew with a view to ascertaining the parentage of certain wild forms. The first was *Odontoglossum Coradinei*, Reichb. f., obtained from *O. Lindleyanum* crossed with an unspotted *O. crispum*, the result being a yellow hybrid blotched with brown, most like the seed-bearer in general character, but completely agreeing with some of the wild forms of this natural hybrid. The cross was made in June 1907, and this is the first of several seedlings to flower. The other flower was *Laeliocattleya* × *armanda*, Reichb. f., obtained by crossing *Laelia Boothiana* with the pollen of *Cattleya intermedia*, and having flowers most like an enlarged edition of the latter with rosy-lilac segments. Of this several seedlings have flowered, the first three years ago. In this case the agreement with the wild hybrid is not complete, the tip being more strongly three-lobed and the flowers rather darker in colour. It is believed, however, to be a form of the same hybrid, which is rather variable. Its complete history is given in the *Orchid Review*, xix., pp. 216–218.

SCIENTIFIC COMMITTEE, JUNE 3, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and seven members present.

Violet with laciniate leaves.—Mr. C. T. Druery, V.M.H., sent a leaf of the sweet Violet with the margins much cut, varying from the normal type in the way in which many species of *Dianthus* vary in their petals (p. cxvii).

Daffodils from New Zealand.—Mr. E. A. Bowles showed flowers of the two varieties of Daffodil, 'King Alfred' and 'Flamingo,' now in bloom on plants raised from bulbs received from New Zealand.

Laeliocattleya × *'Freak.'*—Mr. G. Wilson, F.L.S., showed a plant of *Cattleya citrina* × *Laelia purpurata* from the garden of C. J. Lucas, Esq., Warnham Court, Horsham. The flowers are intermediate in size and colour between those of the parents, and they are produced on a horizontal spike. A Certificate of Appreciation was recommended to Mr. C. J. Lucas.

Primula conspersa.—Messrs. J. Veitch showed specimens of this species of *Primula* from West Kansu, China, raised from seed collected by Mr. Purdom. It is a species of the *farinosa* section flowering later than *P. farinosa*, and with taller stems and larger flowers. The flowers are much the colour of *P. farinosa*.

Cattleya Mossiae bud sport.—Mr. E. H. Davidson sent a plant of *C. Mossiae* 'Golden Ray' having the petals marked with yellow like the labellum. It appears to be a case of irregular peloria, but differing from the usual form of peloria in having the labellum characters showing in the petals, whereas in the usual form the petal characters show in the labellum.

Seedling Saxifrage.—Mr. J. Fraser, F.L.S., exhibited a seedling from *Saxifraga Andrewsii*, the well-known hybrid; but as the seedling was self-sown he had no evidence whether it was a reversion towards *S. Aizoon*, or the result of a cross between *S. Andrewsii* × *S. Aizoon*. The reputed parentage of the former is *S. Geum* × *S. Aizoon*, and the seedling was nearer the latter than the former.

SCIENTIFIC COMMITTEE, JUNE 17, 1913.

Mr. G. MASSEE, F.L.S., V.M.H., in the Chair, and twelve members present.

Colours in Pelargoniums.—Mr. J. Fraser, F.L.S., showed specimens of, and offered remarks upon, the manner in which the bright colours of show Pelargoniums had developed from what was at first a dull-coloured flower with colours spreading merely along the veins in a double feathered line. This later became intensified, forming two spots of deep colour at the tips of the veins. Later still the colour spread from the spots until the whole of the two upper petals became

suffused with the same colour, though probably of lighter intensity, and finally the same colour spread to other parts of the flower.

Blue Oak.—Dr. A. Voelcker showed sections cut across the branches of the oak from which the piece of greenish-grey wood shown by him last year was taken. The oak is at Tewkesbury and has been struck by lightning, but it is improbable that this has had anything to do with the coloration of the wood. The dead branch had more of the colour developed than the living, but the latter showed it to a considerable extent, though in no part was it so intense as in the dead. The heart-wood was not coloured. The appearance was extremely like that described by Von Schrenk in *Bulletin* 36 of the Bureau of Plant Industry, Dep. of Agriculture, U.S. America, under the title of Bluing of Timber, and attributed to the presence of a fungus.

Foxglove branched.—Mr. E. M. Holmes, F.L.S., showed a spike of Foxglove bifurcated about a third of the way up and showing little if any sign of fasciation in the lower part. Other members referred to similar instances.

Sawfly on Apple.—Mr. E. M. Holmes also showed some sawfly larvæ which he had found feeding on the foliage of the Apple. The larvæ belong to *Lygaeonematus moestus*, which Professor Theobald has only recently recorded as British.

Rose with green petals.—Mr. F. J. Chittenden showed the flower of *Rosa canina* with green petals. It had been plucked in a hedge not far from Leatherhead by Mr. Pleese, of Merrow, who had brought it to him.

Viola with fringed foliage.—Mr. C. T. Druery, V.M.H., sent the plant, of which a leaf had been shown at the last meeting, of a Viola with frilled and fringed foliage. It was found in his garden at Acton, and was evidently not *V. odorata* as was at first thought. The species could not be determined from the specimen before the Committee, but was perhaps *V. Riviniana.*

Pelargonium Hybrids.—Mr. A. Langley Smith showed a series of Pelargoniums raised by himself. The first cross was not defined. From it were raised numerous seedlings, varying much in foliage and in habit and colouring of flowers. These were the result of self-pollinating the hybrid. The third set were the result of fertilizing the seedlings so obtained with pollen from the original hybrid. These again showed much variation in foliage &c. (p. cxix).

Gooseberries diseased.—Several specimens of Gooseberry branches were sent. They had died suddenly after starting into growth. This trouble with Gooseberries is usually due to the attack of the fungus *Botryosphaeria ribesii.* It is best to remove and burn the affected branches as soon as they are discovered, not allowing them to remain until the autumn. The branches should be cut away close to their origin, as the fungus fruits near to the base of the affected shoots.

Saxifrage Rust.—Foliage of several of the longifolia group of Saxifrages was sent from Hindhead badly attacked by a rust fungus.

This fungus is a native of Switzerland, and has previously been recorded as attacking species of this section of *Saxifraga* in this country (see *Journal of Botany*, 1908, p. 153). *Puccinia Pazschkei* differs from *P. saxifragae* in having the teleutospores warted instead of striate, and it does not appear to attack the British species of Saxifrage.

Scientific Committee, July 15, 1913.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair, and ten members present.

Proliferation in Rose.—Mr. J. T. Bennett-Poë, V.M.H., showed a Rose having a fasciated and branched shoot bearing several buds developed from its centre. The branch below the flower showed no sign of fasciation.

Lithiasis in Pear.—Mr. W. A. Voss sent a small Pear, 'Doyenné Boussoch,' from a tree of about twenty-five years of age, showing peculiar developments of "stone-cells" breaking through the epidermis here and there. Only one or two fruits on the tree, which was bearing a heavy crop, were affected, and these were from the end of a branch. The trouble is one not commonly met with in England, and has been attributed by German investigators to insufficient water-supply.

Alder diseased.—Mr. J. O'Brien, V.M.H., sent fruits of *Alnus glutinosa*, gathered near Le Touquet from a tree bearing many similar ones, in which some of the carpels had grown out in a peculiar fashion, becoming fleshy and somewhat curled, standing out like leafy projections from the cones. The development of these peculiar growths is due to the attack of the fungus *Ascomyces alnitorquus*.

Poplar diseased.—The Ven. Archdeacon Meredith sent leaves of a Poplar with large golden-yellow areas upon them, occupying in some cases half the leaf surface, due to the fructification of *Ascomyces aureus*, a fungus nearly allied to the one producing leaf-curl in Peaches. One or two of the leaves showed on their upper surfaces the silvery appearance characteristic of the attack of *Stereum purpureum* as seen in Plums.

Liparis lacerata.—Mr. J. O'Brien showed an inflorescence of *Liparis lacerata* (Ridley, in *Journ. Linn. Soc.* xxii. 1886, p. 284. Malay Peninsula, Perak, &c., Dist. Tenasserim, Borneo). A small example is represented in Burbidge's drawings of Borneo plants in the Natural History Museum. The species was little known until it flowered with the Hon. N. Charles Rothschild, and was noted in the "Gardeners' Chronicle," February 15, 1913, p. 99, from a plant sent to him by a collector in Borneo. The present specimen, flowering with Sir Marcus Samuel, was obtained from the same source. Some of the flowers had dropped, but the spike was about nine inches in length.

Robinia Pseudacacia monophylla.—Mr. E. A. Bowles showed flowers

of the variety of *Robinia Pseudacacia* called *monophylla*, obtained in a garden in Italy. It is characterized by the very large terminal leaflet and pair of small ones below it. All the flowers he had examined had two or three carpels, but seed was being produced.

Progeny of Green Wallflower.—Mr. F. J. Chittenden, F.L.S., referred to the Wallflower cross, the F_1 generation of which was shown to the Committee last season (JOURNAL R.H.S., xxxviii. p. xxxix). The original cross was between a "green-flowered" form and the normal form, and in the first generation all the flowers produced in many plants were normal. The self-fertilized seedlings from these plants had in some cases flowered this season, but in insufficient numbers to give any reliable statistics. The results, so far, showed, however, that segregation was occurring, several of the plants producing the "green" abortive flowers, and others the normal flowers. The plants are being grown on.

SCIENTIFIC COMMITTEE, JULY 29, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and thirteen members present, with Mr. A. D. COTTON, F.L.S., a visitor.

Plum-boring Moth.—Mr. E. M. Holmes, F.L.S., showed examples of the work of the larvæ of this moth, and commented upon the damage done and the differences he had observed (particularly in the amount of spotting) in the larvæ in life and as described.

Hybrid Pelargoniums.—Mr. A. Langley Smith showed a number of variations obtained from self-fertilizing the plant obtained as a result of crossing *P. crispum* with an old hybrid fancy called 'The Shah,' and by recrossing the forms among themselves. 'The Shah' is a fancy Pelargonium sent out many years ago by Messrs. Turner, of Slough; its origin is unknown, as Messrs. Turner tell us (*in litt.*). A summary of the results is given below.

Group A: Original Hybrid (*Pelargonium crispum* × *P.* × 'The Shah'), self-pollinated.
,, B: Original Hybrid × Fancies.
,, C: Fancies × Original Hybrid.
,, D: Group C seedlings—self-pollinated.
,, E: Group B seedlings × Group C seedlings.
,, F: Group C seedlings × Group B seedlings.
,, G: Group C seedlings × Fancies.
,, H: Fancies × Group C seedlings.

The terms tall, intermediate, and dwarf have the following significance:—

Tall: Tall upright habit, few branches.
Intermediate: Semi-drooping bushy habit, fairly tall.
Dwarf: Dwarf bushy habit, stiff stems.

A.

	Leaves.	Scented. L	M	S	Not Scented L	M	S
Tall	Entire.	5	1	3	2	..	..
	Lobed.	3	7	4	2	1	1
	Deeply cut.	2	3	1	1	4	0
Intermediate	Entire.	..	..	1	..	..	1
	Lobed.	..	..	..	..	..	..
	Deeply cut.	..	..	1	..	..	..
Dwarf	Entire.	..	3	2	..	3	..
	Lobed.	..	7	2	..	6	..
	Deeply cut.	1	3	..	..	1	1

B.

	Leaves.	Scented. L	M	S	Not Scented. L	M	S
Tall	Entire.	..	2	..	..	..	..
	Lobed.	..	1	..	1	..	..
	Deeply cut.	..	..	..	..	..	..
Intermediate	Entire.	..	1	..	..	..	..
	Lobed.	..	1	..	..	..	..
	Deeply cut.	..	..	..	..	..	..
Dwarf	Entire.	..	..	..	..	1	..
	Lobed.	..	..	..	1	..	..
	Deeply cut.	..	..	..	..	..	1

C.

	Leaves.	L	M	S	L	M	S
Tall	Entire.	..	..	..	..	..	..
	Lobed.	..	..	..	..	..	..
	Deeply cut.	..	..	..	..	..	..
Intermediate	Entire.	..	1	..	..	..	..
	Lobed.	..	1	..	..	1	..
	Deeply cut.	..	..	..	..	..	..
Dwarf	Entire.	..	..	..	..	6	..
	Lobed.	..	1	..	..	3	..
	Deeply cut.	..	..	..	..	..	..

D.

	Leaves.	L	M	S	L	M	S
Tall	Entire.	..	2	..	1	..	..
	Lobed.	..	..	..	2	..	..
	Deeply cut.	..	..	..	..	..	..
Intermediate	Entire.	..	1	1	..	..	..
	Lobed.	1	1	..	..	2	..
	Deeply cut.	..	..	..	..	..	..
Dwarf	Entire.	..	1	1	..	..	1
	Lobed.	..	1	..	..	4	..
	Deeply cut.	..	1	..	..	..	1

E.

	Leaves.	L	M	S	L	M	S
Tall	Entire.	..	..	..	..	..	..
	Lobed.	1	..	..	..	..	..
	Deeply cut.	..	..	..	..	..	..
Intermediate	Entire.	..	..	..	..	..	..
	Lobed.	..	..	..	..	..	..
	Deeply cut.	..	..	..	..	..	..
Dwarf	Entire.	1	..	..	..	..	..
	Lobed.	..	..	..	..	..	..
	Deeply cut.	.	..	..	..	..	..

F.

	Leaves.	L	M	S	L	M	S
Tall	Entire.	..	..	..	..	2	..
	Lobed.	..	1	..	..	..	..
	Deeply cut.	..	..	..	..	..	..
Intermediate	Entire.	..	..	..	..	..	..
	Lobed.	..	..	..	..	2	..
	Deeply cut.	..	..	..	..	..	..
Dwarf	Entire.	..	..	..	..	..	..
	Lobed.	..	1	..	1	1	..
	Deeply cut.	..	..	..	..	..	..

G.

	Leaves.	L	M	S	L	M	S
Tall	Entire.	..	..	..	1	..	..
	Lobed.	..	1	..	..	..	..
	Deeply cut.	..	..	..	..	..	..
Intermediate	Entire.	..	1	..	..	..	..
	Lobed.	..	..	..	..	1	..
	Deeply cut.	..	..	..	....		..
Dwarf	Entire.	..	..	..	2	..	..
	Lobed.	..	..	..	..	1	..
	Deeply cut.	..	..	..	..	..	..

H.

	Leaves.	L	M	S	L	M	S
Tall	Entire.	..	..	..	1	6	..
	Lobed.	..	1	..	1	..	..
	Deeply cut.	..	..	..	..	..	..
Intermediate	Entire.	..	..	..	..	..	..
	Lobed.	..	..	..	....		..
	Deeply cut.	..	..	..	..	..	..
Dwarf	Entire.	..	..	..	..	..	..
	Lobed.	..	..	..	..	..	..
	Deeply cut.	..	..	..	..	..	..

L = large leaves. M = medium-sized leaves. S = small leaves.

A Certificate of Appreciation was recommended to Mr. Smith for his work with these Pelargoniums.

SCIENTIFIC COMMITTEE, AUGUST 12, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and six members present, with Mr. R. FARRER, a visitor.

Agapanthus inapertus syn. *A. Weillighi* Hort.—Mr. A. Worsley showed a specimen of this beautiful species of *Agapanthus*, which he had obtained from Holland. It is fully described at p. 363.

Double Cineraria.—Mr. Worsley also showed heads of a Cineraria with proliferation similar to that seen in the 'Hen and Chickens' Daisies, but with the separate capitula more congested. He remarked that this type of doubling often occurred in forms that normally bear single flowers when they blossom in summer, as in the present instance, and that the normal type would be resumed later on.

Saxifraga florulenta.—This curious species of Saxifraga was sent by Mr. Chaplin, of Great Amwell, Ware, in whose garden it had flowered. It was collected by him and had apparently been growing in shade in cultivation, though it appears to grow alike in sun and shade in its home in the Maritime Alps, where it occurs at high altitudes. It has perhaps only once before flowered in this country, when it was shown by Maw and received a first-class certificate in June 1872. Its foliage is more attractive than its flowers.

Rubus discolor double-flowered.—Mr. Chittenden showed from a correspondent at Haywards Heath a beautiful pink-flowered form of the common bramble with double flowers. It had been found in a hedge and was apparently wild. Several such forms are in cultivation.

Xanthorrhoea australis.—Mr. E. M. Holmes, F.L.S., showed the lower part of the leaf-rosette of this plant, which is now being imported for cattle food on account of the sugar it contains.

Aphis on Picea.—Some shoots of the *Picea pungens glauca* and *P. magnifica* were sent from Lexden attacked by the large aphis which has been so prevalent this year and last on these trees in several parts of the country, and has worked great damage to them. Mr. Chittenden said that several trees had been attacked at Wisley, but the insects had all been killed by one thorough spraying with "Niquas" in May, and the trees had quite regained their beauty. The winter is passed in the egg stage, and spraying should be resorted to as soon as the insects hatch out in spring, any wash containing nicotine being useful.

Apples showing Glassiness.—Some specimens of the apple 'Lord Derby' were sent from South Devon from some cordon trees, and showed the curious phenomenon known as glassiness in a marked manner. The cause leading to this peculiar condition is so far unknown, though it is often attributed to frost. It is evident that

in this and in several similar cases that have recently come to notice this cause cannot have been acting.

Crown Gall.—Mr. H. T. Güssow sent a culture of the *Bacterium tumefaciens* which Dr. Erwin Smith has shown to be the cause of the disease known as crown gall. This disease attacks numerous plants, producing large swellings, generally of a soft nature, on the roots and lower parts of the stems, and in America it is frequently credited with doing damage to the plants attacked. The Committee would be glad to learn whether any serious results have followed the occurrence of such swellings on the roots of plants. Instances have been brought to the notice of the Committee of swellings on Apple, Plum, Birch, Cherry, Peach, Carnation, Marguerite, Blackberry, Loganberry, and Cupressus.

Scientific Committee, August 26, 1913.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair, and seven members present.

Mr. Chittenden reported that the Violet leaves sent by Mr. Druery were attacked by the gall midge, *Cecidomyia violae.*

Double Gladioli.—A letter from Col. Sandeman was read in connexion with the alleged doubling of Gladioli. As no specimen came with the letter, the Committee could not decide the point raised. Incidentally, Dr. Bateson remarked that if the fact were established it would be interesting, as there were several families or orders, such, for example, as the Labiatae, that, although having peloric forms, do not show true doubling of the flower.

Campanula Disease.—Mr. Edwards, of Sylfaen Gardens, Welshpool, sent leaves of *Campanula persicifolia* affected with *Puccinia Campanulae* (Plowright and Berkeley).

Late Brood of Sawfly.—Mr. Edwards also sent a brood of the Sawfly (Gooseberry) caterpillar, *Nematus ribesii.* The Committee thought this should be recorded owing to the very late period of hatching.

Matricaria suaveolens = *M. discoidea.*—Mr. Odell showed this little Composite from N.-W. Middlesex. It is a recent immigrant to this country, and has been recorded by Mr. E. Bowles from Essex and Hertfordshire, and by Mr. J. Fraser from Aberdeen.

Fasciated Aloysia citriodora.—Mr. Odell showed stems of this plant fasciated, and having a very mixed phyllotaxis, with the terminal parts showing the normal terete stem and normal phyllotaxis. Dr. Bateson remarked that the condition was similar to that of the Crown Pea, *Pisum umbellatum*, where from a densely fasciated stem normal shoots were developed with flowers.

FRUIT AND VEGETABLE COMMITTEE.

MAY 14, 1913.

Mr. J. CHEAL in the Chair, and five members present.

No awards were recommended on this occasion.

Exhibits.

W. Arkwright, Esq. (gr. Mr. Stephenson), Chesterfield: Nectarine 'Early Rivers.'

C. H. Paynter, Esq., St. Buryan: Tomatos.

FRUIT AND VEGETABLE COMMITTEE, JUNE 3, 1913.

Mr. A. H. PEARSON, J.P., V.M.H., in the Chair, and nine members present.

Award Recommended:—

Silver Banksian Medal.

To Messrs. Carter, Raynes Park, for Lettuces.

Other Exhibit.

Rt. Hon. Earl of Denbigh, Lutterworth: Tomatos.

FRUIT AND VEGETABLE COMMITTEE, JUNE 17, 1913.

Mr. J. CHEAL in the Chair, and sixteen members present.

Awards Recommended:—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for Vegetables.

Bronze Banksian Medal.

To Messrs. Dobbie, Edinburgh, for Cabbages.

Cultural Commendation.

To Mr. A. E. Course, Biggleswade, for Asparagus.

Other Exhibit.

Mr. S. Mortimer, Farnham: Cucumber 'Continuity.'

FRUIT AND VEGETABLE COMMITTEE, JUNE 24, 1913.

SUB-COMMITTEE AT WISLEY.

Mr. J. CHEAL in the Chair, and six members present.

The Sub-Committee inspected the trials and selected the following for presentation to the full Committee, making the following recommendations as to awards:—

First-class Certificate.

To Strawberry 'Connoisseur.'

Award of Merit.

To Peas:—No. 92. 'King of the Dwarfs.'
No. 163. 'Superb.'
No. 175. 'The Pilot,' **A.M.** July 3, 1903.
No. 197. No. 3879

Highly Commended.

To Peas:—No. 84. 'Hundredfold,' **A.M.** July 5, 1910.
No. 153. 'Snowdrop,' **F.C.C.** Aug. 30, 1883.

FRUIT AND VEGETABLE COMMITTEE, JULY 1, 1913.

AT HOLLAND HOUSE.

Mr. W. POUPART in the Chair, and seventeen members present.

[For Cups and Medals awarded by the Council, see p. cii].

Awards Recommended:—

First-class Certificate.

To Strawberry 'Connoisseur,' from Messrs. Laxton, Bedford.

Award of Merit.

To Pea 'King of the Dwarfs,' from Messrs. Sutton, Reading.
To Pea 'Superb,' from Messrs. Laxton, Bedford.
To Pea 'No. 3879,' from Messrs. Hurst, Houndsditch.
For descriptions see Reports of trials at Wisley, 1913.

Cultural Commendation.

To Messrs. Pither, Uxbridge, for Mushroom 'Bide's Market.'

Other Exhibits.

Messrs. Laxton, Bedford: Peach 'Laxton's Advance.'
Messrs. Seabrook, Chelmsford: Black Currant 'Seabrook's Black.'
H. P. Sturgis, Esq., Leatherhead: Strawberry 'Peter's Olympia,' **A.M.** 1911.

FRUIT AND VEGETABLE COMMITTEE, JULY 7, 1913.

SUB-COMMITTEE AT WISLEY.

Mr. W. POUPART in the Chair, and two members present.

The Sub-Committee inspected the trials and selected the following for presentation to the full Committee, making the following recommendations as to awards:—

First-class Certificate.

To Strawberry 'British Queen.'

Award of Merit.

To Strawberry 'Cropper.'
To Strawberry 'Fillbasket,' **A.M.** July 23, 1907.

To Strawberry 'Progress.'
To Strawberry 'Rival.'
To Peas:—Nos. 3, 4. 'Alderman,' **F.C.C.** July 10, 1900.
No. 59. 'Exhibition,' **A.M.** Aug. 16, 1910.
No. 62. 'Favourite.'
No. 115. 'Masterpiece.'
No. 134. 'Premier,' **A.M.** July 18, 1911.
No. 142. 'Quite Content,' **F.C.C.** Aug. 14, 1906.
No. 152. 'Sir Arthur Bignold.'
No. 185. 'Warriston Wonder.'

Highly Commended.

To Peas:—No. 5. 'America,' **A.M.** July 18, 1911.
No. 9. 'Battleship.'
No. 13. 'Best of All.'
No. 31. 'Discovery.'
No. 83. 'Harvestman,' **A.M.** June 30, 1908.
No. 88. 'International,' **A.M.** June 30, 1908.
No. 98. 'Laxtonian,' **A.M.** July 5, 1910.
No. 105. 'Magnum Bonum,' **A.M.** Aug. 16, 1910.
No. 112. 'Marquis of Stafford.'
No. 127. 'Peerless,' **F.C.C.** July 14, 1903.
No. 140. 'Prodigy,' **F.C.C.** July 10, 1885.
No. 171. 'The Clipper.'
No. 179. 'Up to Date.'
No. 184. 'Victor,' **A.M.** July 5, 1910.
No. 212. 'Orwell.'

Commended.

To Pea:—No. 85. Ideal, **F.C.C.** July 3, 1903.

FRUIT AND VEGETABLE COMMITTEE, JULY 15, 1913.

Mr. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Awards Recommended:—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for fruit trees in pots.

Silver Knightian Medal.

To Lady Wernher (gr. Mr. Metcalfe), Luton, for Strawberries.

Cultural Commendation.

To W. J. Sanderson, Esq., Warkworth, for Strawberry 'Bedford Champion.'

The following awards were made to produce after trial at Wisley. For descriptions see Reports of trials.

First-class Certificate.

To Strawberry 'British Queen,' from R.H.S. Gardens, Wisley.

Award of Merit.

To Strawberry 'Cropper,' from Messrs. Laxton, Bedford.
To Strawberry 'Progress,' from Messrs. Laxton, Bedford.
To Strawberry 'Rival,' from Messrs. Laxton, Bedford.
To Pea 'Favourite,' from Messrs. J. Veitch, Chelsea.
To Pea 'Masterpiece,' from Messrs. Sutton, Reading.
To Pea 'Sir Arthur Bignold,' from Mr. W. G. Holmes, Tain.
To Pea 'Warriston Wonder,' from Messrs. Bell & Bieberstedt, Leith.

Highly Commended.

Pea 'Battleship,' from Messrs. Carter, Raynes Park.
Pea 'Best of All,' from Messrs. Wheeler, Gloucester.
Pea 'Discovery,' from Messrs. Dickson, Newtownards.
Pea 'Marquis of Stafford,' from Mr. W. G. Holmes, Tain.
Pea 'The Clipper,' from Messrs. R. Sydenham, Birmingham.
Pea 'Up to Date,' from Messrs. Sutton, Reading.
Pea 'Orwell,' from Mr. R. Staward, Hertford.

Other Exhibits.

Lady Egerton, Thame: Strawberry 'The Laxton.'
A. Faulknor, Esq., Hungerford: Seedling Raspberry.
Hon. Vicary Gibbs, Elstree: Beetroot 'Veitch's New Intermediate.'
T. Meredith, Esq., Coventry: curious specimen of Kale.

FRUIT AND VEGETABLE COMMITTEE, JULY 21, 1913.

SUB-COMMITTEE AT WISLEY.

Mr. W. POUPART in the Chair, and four members present.

The Sub-Committee inspected the trials and selected the following for presentation to the full Committee, making the following recommendations as to awards:—

Award of Merit.

To Pea No. 25. 'Daisy.'
To Pea No. 83. 'Harvestman,' **A.M.** June 30, 1908.
To Pea No. 88. 'International,' **A.M.** June 30, 1908.
To Pea No. 184. 'Victor,' **A.M.** July 5, 1910.
To Turnip No. 57. 'Early Snowball.'
To French Bean. 'Perpetual.'
To French Bean. 'Sunrise.'

Highly Commended.

To Pea No. 102. 'Little Marvel,' **A.M.** July 11, 1902.
To Pea No. 151. 'Seedling.'

To Turnip No. 1. 'All the Year Round.'
To Turnip No. 4. 'Covent Garden Snowball.'
To Turnip No. 7. 'Criterion.'
To Turnip No. 27. 'Milan, Extra Early,' **F.C.C.** June 12; 1883.
To Turnip No. 31. 'Milan, White.'
To Turnip No. 32. 'Milan, Red Top Early.'
To Turnip No. 43. 'Model White Stone.'
To Turnip No. 47. 'Manchester Market.'
To Turnip No. 53. 'Red Globe.'
To Potato No. 14. 'Western Hero.'
To Potato No. 18. 'Surprise.'

FRUIT AND VEGETABLE COMMITTEE, JULY 29, 1913.

Mr. A. H. PEARSON, J.P., V.M.H., in the Chair, and six members present.

Awards Recommended:—

Silver Knightian Medal.

To Lady Wernher (gr. Mr. Metcalfe), Luton, for Melons and Grapes.

Cultural Commendation.

To Leopold de Rothschild, Esq., C.V.O. (gr. Mr. J. Hudson, V.M.H.), Acton, for a pot-grown tree of Fig 'Bourjassote Grise.'

All the following awards were made to produce tried at Wisley. For descriptions see Reports of Trials.

Award of Merit.

To French Bean 'Perpetual,' from Messrs. Carter, Raynes Park.
To French Bean 'Sunrise,' from Messrs. Carter, Raynes Park.
To Turnip 'Early Snowball,' from Messrs. Sutton, Reading.

Highly Commended.

Pea 'Seedling,' from Messrs. Sutton, Reading.
Potato 'Surprise,' from Messrs. Carter, Raynes Park.
Potato 'Western Hero,' from Messrs. R. Veitch, Exeter.
Turnip 'All the Year Round,' from Messrs. Carter, Raynes Park.
Turnip 'Milan (White),' from Messrs. Carter, Raynes Park.
Turnip 'Milan (Red-top Early),' from Messrs. Carter, Raynes Park.
Turnip 'Covent Garden Snowball,' from Messrs. Barr, Taplow.
Turnip 'Criterion,' from Messrs. Sutton, Reading.
Turnip 'Model White Stone,' from Messrs. Sydenham, Birmingham.
Turnip 'Manchester Market,' from Messrs. Sharpe, Sleaford.
Turnip 'Red Globe,' from Messrs. J. Veitch, Chelsea.

Other Exhibits.

H. Chapman, Esq., Rye: Vegetable Marrows.
Mr. A. Faulknor, Hungerford: Raspberries.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 12, 1913.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Award Recommended :—

Silver-gilt Knightian Medal.

To Messrs. J. Veitch, Chelsea, for fruit trees in pots.

Other Exhibits.

Mr. A. Faulknor, Hungerford : Raspberry 'Inkpen Prolific.'
Mr. J. Miles, Erith : Raspberries.
Mr. W. Profittlich, Twickenham : Blackberries.
Messrs. Whitelegg and Page, Chislehurst : Tomato 'The Cropper.'

FRUIT AND VEGETABLE COMMITTEE, AUGUST 22, 1913.

SUB-COMMITTEE AT WISLEY.

Mr. J. CHEAL in the Chair, and eight members present.

Awards Recommended :—

Award of Merit.

To Potato No. 27. 'Irish King.'
To Tomato No. 42. 'Holme's Ideal.'
To Tomato No. 43. 'Holyrood.'
To Tomato No. 44. 'Hurst Marvel.'
To Tomato No. 47. 'Liberty.'
To Tomato No. 48. 'Lightning.'
To Tomato No. 68. 'Pear-shaped.'

Highly Commended.

Potato No. 30. 'Great Scot,' **A.M.** Sept. 26, 1911.
Potato No. 41. 'Seedling, No. 28.'
Potato No. 58. 'Southern Star,' **A.M.** Nov. 21, 1905.
Tomato No. 34. 'Garland.'
Tomato No. 39. 'Golden Sunrise.'

FRUIT AND VEGETABLE COMMITTEE, AUGUST 26, 1913.

Mr. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Baker, Wolverhampton, for vegetables.

Silver-gilt Banksian Medal.

To Messrs. Bunyard, Maidstone, for fruit.

Silver Knightian Medal.

To Messrs. Spooner, Hounslow, for Apples.

Bronze Banksian Medal.

To C. E. Baring Young, Esq. (gr. Mr. Walker), East Barnet, for fruit.

Award of Merit.

To Apple 'Maidstone Favourite' (votes, unanimous), from Messrs. Bunyard, Maidstone. Fruit of medium size, perfectly shaped, flattish; skin almost entirely coloured with red spots; eye partly open, with slightly incurved segments set in a shallow, even basin. Stalk half an inch long, inserted in a rather deep russety cavity. Flesh white, soft, juicy, and of pleasant flavour. Tree of sturdy habit and a good bearer. It should prove a valuable market apple for dessert, as it comes into use between 'Beauty of Bath' and 'Worcester Pearmain.' It is a seedling from 'Emperor Alexander' probably crossed with 'Beauty of Bath,' which it somewhat resembles in appearance, but it is larger and later. (Fig. 143.)

To Potato 'Irish King' (votes, unanimous), from Messrs. Barr, Covent Garden, W.C. For description see report of Wisley trial.

Highly Commended.

Potato 'Raynes Park White,' from Messrs. Carter, Raynes Park.
Tomato 'Garland,' from Messrs. Dobbie, Edinburgh.
Tomato 'Golden Sunrise,' from Messrs. Carter, Raynes Park.
Tomato 'Holme's Ideal,' from Messrs. Sydenham, Birmingham.
Tomato 'Holyrood,' from Messrs. Dobbie, Edinburgh.
Tomato 'Hurst Marvel,' from Messrs. Drover, Hurstpierpoint.
Tomato 'Liberty,' from Messrs. A. Dickson, Newtownards.
Tomato 'Lightning,' from Messrs. Barr, Covent Garden.
Tomato 'Pear-shaped,' from Messrs. Barr, Covent Garden.

For descriptions of the above see Reports of Wisley Trials.

Other Exhibits.

Messrs. Bucks, Ipswich: Tomato 'Bucks' Tresco.'

FLORAL COMMITTEE.

MAY 14, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Dobbie, Edinburgh, for Sweet Peas, Violas, &c.

To Messrs. Mount, Canterbury, for Roses.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations, Roses, &c.

Silver Flora Medal.

To Mrs. Lloyd Edwards, Llangollen, for Saxifrages.

To Mr. G. Reuthe, Keston, for flowering shrubs and alpines.

To Messrs. J. Veitch, Chelsea, for Cape Pelargoniums and Auriculas.

Silver Banksian Medal.

To Messrs. B. R. Cant, Colchester, for Roses.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

To Mr. H. Hemsley, Crawley, for hardy plants.

To Mr. P. Ladds, Swanley, for miscellaneous flowering plants.

To Messrs. S. Low, Bush Hill Park, for Carnations.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

To Messrs. G. Paul, Cheshunt, for flowering shrubs.

To Mr. C. Turner, Slough, for Caladiums, &c.

Bronze Flora Medal.

To Messrs. Cheal, Crawley, for rock plants and shrubs.

To Messrs. Fells, Letchworth, for hardy plants.

To Colonel Sir Mark Lockwood (gr. Mr. Cradduck), Romford, for Schizanthus.

To Messrs. Reamsbottom, Geashill, for Anemones.

To Wargrave Plant Farm, Liverpool Street, for rockery.

To Messrs. Whitelegg and Page, Chislehurst, for Violas.

Bronze Banksian Medal.

To Messrs. Carter Page, London Wall, for Violas and Annuals.

First-class Certificate.

To Pæony ' La Lorraine ' (votes, unanimous), from Messrs. Piper, Bayswater. A remarkable hybrid between *P. lutea* and *P. Moutan* ' Princess Elizabeth.' The foliage is glaucous and resembles that of the latter parent. The flowers are large, and measure 6 inches across.

They are very full and double, and are of a pale sulphur-yellow colour, with crimson markings at the base of the petals. Messrs. Lemoine, of Nancy, are the raisers, and the plant is said to be a robust grower.

Award of Merit.

To *Aster Purdomii* (votes, 10 for, 4 against), from Messrs. J. Veitch, Chelsea. A very pretty and perfectly hardy species, introduced from the mountains of Tai-pei-shan, Shensi, North China, by Mr. Purdom. The solitary flowers, which somewhat resemble those of *A. alpinus*, are borne very freely, and are of a pale rose-violet colour, with a pale yellow centre. They measure about $2\frac{1}{2}$ inches across. The radical leaves are ovate-elliptic, hairy, and have two or three marginal teeth. The height of the plant is about 9 inches.

To Carnation 'Lady Ingestre' (votes, 8 for, 3 against), from Messrs. Cutbush, Highgate. A perpetual-flowering variety, having large and very double flowers of excellent form, and of a charming shade of salmon pink. The edges of the petals are prettily crinkled, and the plant is a strong grower.

To Heliotrope 'The Speaker' (votes, 13 for, 3 against), from Mr. P. Ladds, Swanley. A dark-coloured seedling having large trusses of very sweetly scented flowers. It is very compact and bushy in habit.

To *Rhododendron* 'Rose Queen' (votes, unanimous), from Miss Clara Mangles, Littleworth, Seale, Surrey. A lovely hybrid, having rosé-pink funnel-shaped flowers, tinged with orange at the base of the tube. They are scented, borne in trusses of seven or eight, and measure nearly 3 inches across when fully open. The leaves are lanceolate in shape.

To *Rhododendron Wightii* (votes, unanimous), from Miss Clara Mangles, Littleworth, Seale, Surrey. A remarkable Rhododendron, bearing clusters of about a score of bell-shaped flowers at the ends of the shoots. The flowers are pale sulphur-yellow in colour, with crimson markings at the base, and are borne on pedicels 4 inches long. The leaves are lanceolate, dark green above, and covered with a brown tomentum beneath.

To Rose 'Miss Flora Mitten' (votes, unanimous), from Mr. J. Elliott, Hassocks. A charming climbing variety, bearing numerous large, single flowers, of a delicate pink colour. It was raised by the late Mr. W. Mitten, of Hurstpierpoint, and it is believed to be a seedling from *R. Brunonii*. It is a strong grower, and blooms over a long period, first on the laterals, and later on the sub-laterals.

To *Thunbergia Gibsonii* (votes, unanimous), from W. Van de Weyer, Esq., Smedmore House, Corfe Castle, Dorset. A very striking plant from the open plains of British East Africa, where the temperature ranges from 40°–80° F. The flowers measure $1\frac{1}{2}$ inch across, and are of an uncommon and beautiful shade of Chinese orange (shade 4, "Répertoire de Couleurs"). They are axillary, on pedicels about 4 inches long, and have large, curiously inflated and keeled

calyces, blotched with chocolate-brown. The leaves are opposite, ovate-lanceolate, cordate at the base, and, like the calyces and stems, are covered with hairs. The plant is prostrate in habit.

Other Exhibits.

Messrs. Baker, Codsall : rockery.
Mr. W. Baxter, Plumstead : Pelargonium ' Cotswold.'
Messrs. Clark, Dover : hardy plants.
Miss Dixon, Edenbridge : Lilies and Myosotis.
Messrs. Goos and Koenemann, Rheingau, Germany : Irises.
Mr. W. Hay, Hexham : Roses.
Mr. E. J. Hicks, Twyford : Roses.
Misses Hopkins, Shepperton : hardy plants.
Mary, Countess of Ilchester, South Kensington : *Petrea volubilis* and *Mackaya bella.*
Sir Trevor Lawrence, Bt., Dorking : Lilac ' Léon Gambetta.'
Miss N. Lucas, Hale : Myosotis ' Royal Blue Improved ' and *Viola gracilis* ' Primrose.'
Mr. G. W. Miller, Wisbech : Violas, &c.
Mr. H. Robertson, Dundee : Wallflower ' Golden Dawn.'
Messrs. Ware, Feltham : rockery.
Messrs. Wells, Merstham : Carnations.
Miss E. Willmott, V.M.H., Great Warley : Tritonias.

Floral Committee, May 20, 1913.

At Chelsea.

Mr. H. B. May, V.M.H., in the Chair, and nineteen members present.

[For awards of Cups and Medals made by the Council after consultation with the Judges, see p. xciv.]

Awards Recommended :—

First-class Certificate.

To *Cupressus Lawsoniana Fletcheri* (votes, 14 for), from Messrs. Fletcher, Bros., Ottershaw Nursery, Chertsey. A very distinct sport from the type, having a very dense, bushy, and erect habit of growth. It branches freely and has greyish foliage. The specimens were about 18 inches high and admirably adapted for the rock garden. (Fig. 144.)

To *Meconopsis Delavayi* (votes, unanimous), from the Regius Keeper, Botanic Garden, Edinburgh. A charming plant, about 5 inches high, having large, solitary, pendent flowers of a deep violet-purple colour. The big bunch of golden anthers forms a pleasing contrast. The leaves are ovate-lanceolate, pale green above and glaucous beneath.

To *Nephrolepis exaltata Willmottae* (votes, unanimous), from Messrs. May, Upper Edmonton. This fern received an Award of Merit, November 5, 1912. It has very finely divided, densely plumose fronds, and is more moss-like than *N. exaltata Marshallii compacta.*

FIG. 143.—APPLE ' MAIDSTONE FAVOURITE.' (*Garden.*((p. cxxix.)

[*To face p.* cxxxii.

FIG. 144.—CUPRESSUS LAWSONIANA FLETCHERI. (*Gardeners' Magazine.*)

(p. cxxxii.)

FIG. 145.—CAMPANULA STEVENII NANA. (*Garden.*) (p. cxxxiii.)

FIG. 146.—ROSCOEA CAUTLIOIDES (*Bees.*) (p. cxxxiii.)

[*To face p.* cxxxiii

Award of Merit.

To *Aster Falconeri* (votes, unanimous), from Messrs. Barr, 11 King Street, Covent Garden. A useful hardy plant for the rock garden. It grows about 1 foot high and produces large flowers, of which the ray florets are violet-mauve and the disc golden yellow. The leaves are lanceolate and sessile, and are covered with hairs.

To Auricula 'William Smith' (votes, 8 for), from Mr. J. Douglas, Great Bookham. A fine green-edged variety, having a perfect pure white paste, surrounded by a zone of dark brownish colour. The individual flowers are large, and they are borne in a fine truss.

To *Begonia* 'Lena' (votes, 10 for, 5 against), from Messrs. Blackmore and Langdon, Twerton-on-Avon, Bath. A beautiful carmine-rose hybrid variety for growing in baskets. The flowers are semi-double and have long pointed petals. They are very freely produced, and hang down over the sides of the basket. The leaves are long and narrow, and irregularly serrated.

To *Calceolaria* 'Clarefield Gem' (votes, 12 for, 1 against), from Mrs. Litkie (gr. Mr. Hulbert), Clarefield, Pinkneys Green. This charming hybrid is the result of a cross between *C. profusa* type, and the herbaceous Calceolaria. It has the tall growth and free-branching habit which are characteristic of *C. Clibranii*, but the flowers are larger and are borne more closely on the stem. The pouch is circular, and has a yellow ground-colour, shaded with orange and spotted with crimson.

To *Campanula Stevenii nana* (votes, unanimous), from Mr. R. Prichard, West Moors. A lovely plant for the rockery, forming a dense carpet of small linear leaves, above which arise the comparatively large mauve flowers. The pedicels are very short, and rarely exceed 2 inches in length. The colour of the flowers is rather deeper than that of the type, and the blossoms are very open. The plant is free-flowering, quite hardy, and one of the first Campanulas to flower. (Fig. 145.)

To *Cytisus Andreanus prostratus* (votes, 11 for), from Mr. L. R. Russell, Richmond. A pendent form of this well-known shrub. The flowers are large and yellow, with chestnut-red wings. The specimen exhibited was shown as a weeping standard.

To *Lonicera tragophylla* (votes, 9 for), from Messrs. J. Veitch, Chelsea. A new Chinese species, of twining habit. The flowers are deep lemon-yellow, and the corolla tube measures $2\frac{3}{4}$ inches long. The leaves are elliptic, with pinkish midribs. The upper pair of leaves are connate.

To *Pentstemon Davidsonii* (votes, unanimous), from Mr. C. Elliott, Stevenage. A very free-flowering hardy moraine plant, of prostrate growth, from the Rocky Mountains. The flowers are deep rose, and the tube measures about $1\frac{1}{4}$ inch long. The leaves are small, round, and serrate.

To *Roscoea cautlioides* (votes, 11 for), from Messrs. Bees, Ltd., Liverpool. A very pretty plant from China, which has proved hardy in the nurseries of the exhibitors. The flowers are pale sulphur-

yellow, and have the upper petals hooded, while the broad frill gives an Iris-like appearance. The plant grows about 1 foot high, and the lanceolate leaves clasp the flower stem. (Fig. 146.)

To Rose 'Irish Fireflame' (votes, 11 for, 1 against), from Messrs. Alex. Dickson, Newtownards, Ireland. A charming single Rose like 'Irish Elegance' in form, but having the beautiful long buds of a rich coppery-orange colour, changing to apricot when the flower is fully open. It is a free and perpetual flowering variety, and the dark, glossy, green foliage forms a pleasing background to the lovely colour of the blooms.

To Rose 'Mrs. Campbell Hall' (votes, unanimous), from Messrs. Alex. Dickson, Newtownards, Ireland. A very fine 'Tea' Rose, of large size and wonderful substance. It is creamy white in colour, prettily suffused with pink, especially in the bud state. It is pleasantly scented.

To Rose 'Nancy Perkins' (votes, unanimous), from Messrs. T. Perkins, Northampton. A very dwarf white Polyantha Rose, of exceedingly free-flowering habit. The flowers measure about 1 inch across, and are very double. They have a pleasing scent. The plants exhibited were about 1 foot high.

To Rose 'White Tausendschön' (votes, 14 for, 3 against), from Messrs. W. Paul, Waltham Cross. This is a good rambler, similar in habit, foliage, vigour, and size of flower to 'Tausendschön,' from which it is a sport. The flowers are white, delicately tinted with pink in the bud state. They are borne very freely in large clusters.

To *Sarracenia Brucei* (votes, unanimous), from Mr. A. J. A. Bruce, Chorlton-cum-Hardy. A very handsome variety, having a long, gradually tapering trumpet, veined in the upper half with crimson. The pitcher has a large lid with frilled margins. The flowers are green and the reverse of the sepals shaded crimson.

To *Saxifraga Grandfieldii* (votes, 8 for, 4 against), from Sir Everard Hambro, K.C.V.O. (gr. Mr. Grandfield), Hayes, Kent. A fine encrusted variety, of garden origin, bearing spikes of pure white flowers. The leaves are serrated and arranged in rosettes, from which the flower spikes arise. The stems and pedicels are covered with hairs. The plant is about 1 foot high. The specimen exhibited was growing in a 6-inch pan, and carried eleven spikes of fully-expanded flowers.

To *Styrax Wilsonii* (votes, unanimous), from Miss Willmott, F.L.S., V.M.H. (gr. Mr. Fielder, V.M.H.), Great Warley. A very graceful Chinese shrub, of dwarf habit. The twigs are wiry, and carry small ovate-lanceolate leaves having a few irregular notches. The flowers are white, pendulous, freely borne, and have prominent cream anthers. It possesses a similar degree of hardiness to that of *S. japonicum.*

Botanical Certificate.

To *Olearia chathamica* (votes, unanimous), from Rev. A. T. Boscawen, Long Rock, Cornwall. An interesting species from New

Zealand, bearing aster-like flowers nearly 3 inches across, which have the rays white, slightly shaded with mauve, and the disc violet-purple. The leaves are lanceolate, serrate, dark green above and covered with white tomentum beneath. The plant is hardy in Cornwall, and has withstood 15°–18° of frost. (Fig. 147.)

Other Exhibits.

Messrs. Brown, Peterborough: Gaillardia 'The King.'

Messrs. Cuthbert, Southgate: Azaleas and Tulips.

Messrs. Dobbie, Edinburgh: Sweet Peas.

Mr. W. Easlea, Leigh-on-Sea: Rose 'Susie.'

Mrs. Lloyd Edwards, Llangollen: Myosotis 'Souvenir of Wm. Walton.'

Messrs. Godfrey, Exmouth: Pelargoniums.

Messrs. Goos and Koenemann, Rheingau, Germany: Irises.

Mr. H. Hemsley, Crawley: hardy plants.

Miss Hemus, Upton-on-Severn: Petunia 'Paradise Blue.'

Messrs. Hill, Lower Edmonton: *Nephrolepis exaltata fortis.*

Messrs. Hobbies, Dereham: Roses.

Messrs. Kelway, Langport: Cheiranthus 'Langport Purple.'

Messrs. E. W. King, Coggeshall: Sweet Pea 'Anglian Fairy.'

Mr. W. Lawrenson, Yarm-on-Tees: Primula 'Yarm var.'

Mr. W. A. Manda, St. Albans: miscellaneous plants.

Messrs. G. Paul, Cheshunt: Azaleas.

Messrs. Robichon, Orleans: Roses.

Messrs. Storrie and Storrie, Glencarse: Auricula 'Creamy White' strain.

Messrs. Sydenham, Birmingham: Sweet Pea 'Princess Mary.'

Messrs. Thompson and Charman, Bushey: hardy plants.

Messrs. R. Veitch, Exeter: Calceolarias.

Messrs. Wallace, Colchester: hardy plants.

Wargrave Plant Farm, London: *Viola gracilis* 'Lady Crisp' and Tulip 'Kathleen Moffat.'

Messrs. Webb, Stourbridge: *Schizanthus Crooksii.*

Floral Committee, June 3, 1913.

Mr. H. B. May, V.M.H., in the Chair, and thirty members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Dobbie, Edinburgh, for Sweet Peas, Antirrhinums, and Aquilegias.

To Messrs. J. Veitch, Chelsea, for Anchusas, Fuchsias, and Gloxinias.

Silver-gilt Banksian Medal.

To Messrs. Cannell, Swanley, for Cannas and Pelargoniums.

Silver Flora Medal.

To Messrs. Bunyard, Maidstone, for hardy plants.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Kelway, Langport, for hardy plants.

To A. G. Waley, Esq. (gr. Mr. M. A. Dobson), Reigate, for Schizanthus.

To Mr. J. D. Webster, Chichester, for Carnations.

Silver Banksian Medal.

To Messrs. Bath, Wisbech, for Tulips and Sweet Peas.

To Mr. C. Blick, Hayes, for Carnations.

To Mr. J. Box, Haywards Heath, for hardy plants.

To Messrs. Burch, Peterborough, for Roses.

To Messrs. Clark, Dover, for hardy plants.

To Messrs. Cutbush, Highgate, for Roses and Carnations.

To Messrs. Gunn, Olton, for Phloxes.

To Messrs. Jackman, Woking, for hardy plants.

To Messrs. S. Low, Bush Hill Park, for Carnations.

To Messrs. May, Upper Edmonton, for ferns.

To Mr. A. Perry, Enfield, for Poppies and Irises.

To Mr. G. Reuthe, Keston, for hardy plants.

To Mr. L. R. Russell, Richmond, for shrubs.

To Messrs. Wallace, Colchester, for hardy plants.

Bronze Flora Medal.

To Messrs. Barr, Taplow, for hardy plants.

To M. Drummond, Esq. (gr. Mr. L. Smith), Southampton, for Aquilegias.

To Messrs. Godfrey, Exmouth, for Poppies and Pelargoniums.

To Mr. A. Ll. Gwillim, Sidcup, for Gloxinias &c.

To Messrs. Piper, Bayswater, for Wistarias &c.

To Mr. M. Prichard, Christchurch, for hardy plants.

To Messrs. Ware, Feltham, for hardy plants.

Award of Merit.

To Delphinium 'Mrs. F. Brewster' (votes, 14 for, 4 against), from Mr. R. C. Notcutt, Woodbridge. The flowers of this variety measure 2 inches across, and are violet-mauve in colour, tinted with pale corn-flower blue. The centre has a few traces of white. The spike exhibited was tall and tapering, and the flowers were not crowded upon it.

To *Iris gracilipes* (votes, 17 for), from the Wargrave Plant Farm, Liverpool Street, E.C. A free-flowering dwarf species from Japan, bearing small pale lilac flowers. The leaves are narrow and grass-like. The plant is about 8 inches high.

To *Paeonia* 'L'Espérance' (votes, unanimous), from Messrs. Kelway, Langport. A remarkable hybrid between *P. lutea* and *P. Moutan*. The flowers are pale lemon-yellow in colour, and have two rows of petals, each of which has a dull crimson blotch at the

base. The anthers are golden, and the blooms measure 6 inches across. The foliage is like that of *P. Moutan.*

To *Papaver orientale* 'Perry's Unique' (votes, 15 for, 2 against), from Mr. A. Perry, Enfield. A good border variety, growing 18 inches high, and bearing bright scarlet single flowers measuring 6 inches across. Each petal has a dark blotch, and the margin is deeply fringed.

To Potentilla 'Boule de Feu' (votes, 11 for, 1 against), from Mr. H. Hemsley, Crawley. This useful rock plant is the result of a cross between *P. argyrophylla* and *P. atrosanguinea.* It has deep scarlet flowers and silvery foliage. It is free-flowering, and grows from 6 to 8 inches high.

To *Primula* × 'Excelsior' (votes, unanimous), from Messrs. J. Veitch, Chelsea. A charming Primula resulting from a cross between *P.* × Unique ♂ and *P. Cockburniana* ♀. In the size of the flowers and in the foliage it resembles the former, but it is of a rich cherry-red (shade 3, "Répertoire de Couleurs"). The stems and calyces are covered with farina. The plant is hardy, perennial, and about 1 foot high.

To *Salix magnifica* (votes, 13 for), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree. A remarkable Chinese shrub, quite unlike the already known species of *Salix.* The leaves are ovate, measuring 6 inches long by 3½ inches broad, dark green above and light green below, glabrous, minutely serrated, and joined to the main stem by dull red petioles. The shrub appears to be a quick grower, and is a very decorative foliage plant. (Fig. 148.)

To *Stachys corsica* (votes, 10 for, 4 against), from Messrs. Wallace, Colchester. A pretty prostrate species, suitable for the rock-garden. It is covered with small creamy-white flowers, which are tinged with pink. The leaves are small and ovate.

Cultural Commendation.

To Sir Everard Hambro, K.C.V.O. (gr. Mr. Grandfield), Hayes Place, Hayes, for a very fine 15-year-old specimen of *Saxifraga longifolia* growing in a pan.

Other Exhibits.

Messrs. Artindale, Sheffield: hardy plants.

Messrs. Baker, Codsall: hardy plants.

Messrs. Barber, Newcastle: Chrysanthemum 'Queen of the Earlies.'

Mr. W. Baxter, Plumstead: Geranium 'Cotswold.'

Messrs. Bide, Farnham: Sweet Peas.

Messrs. Brown, Peterborough: hardy plants.

Messrs. Cannell, Eynsford: Roses.

Mr. C. W. Chantler, St. Mary Cray: Irises, &c.

Messrs. Cheal, Crawley: flowering shrubs.

Mr. C. Elliott, Stevenage: alpines.

Messrs. Fells, Letchworth: hardy plants.

Mr. E. J. Hicks, Twyford: Roses.
Misses Hopkins, Shepperton: hardy plants.
Mr. W. Lawrenson, Yarm: Poppy 'Lady in White.'
Messrs. Carter Page, London Wall: Pelargoniums, Violas, &c.
Messrs. G. Paul, Cheshunt: Rose species.
Messrs. Peed, West Norwood: Gloxinias.
Messrs. Perkins, Northampton: Rose 'Nancy Perkins.'
Messrs. Reamsbottom, Geashill: Anemones.
Messrs. Rochford, Broxbourne: Araucaria 'Silver Star.'
Mr. A. L. Smith, Catford: Cape Pelargoniums.
Messrs. Sutton, Reading: Aquilegias.
H. J. Talbot, Esq., Berkhampstead: Stock 'Beauty of Nice.'
Messrs. Thomson and Charman, Bushey: alpines.
Messrs. Whitelegg and Page, Chislehurst: hardy plants.

Floral Committee, June 5, 1913.

Sub-Committee at Wisley.

Mr. H. B. May, V.M.H., in the Chair, and eight members present.

Awards Recommended:—

Award of Merit.

To the following Violas, which were planted in October 1912: 'Admiral of the Blues,' 'Agnes Kay,' 'Alexandra,' 'Bethea,' 'Blue Duchess,' 'Bridal Morn,' 'Fred Williams,' 'Purity,' 'Redbraes Bronze,' 'Redbraes White,' 'Redbraes Yellow,' 'Royal Scot,' 'Sulphurea,' and 'Virgin White.'

(For descriptions, see Report of Wisley trial, p. 381.)

Floral Committee, June 17, 1913.

Mr. H. B. May, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. B. R. Cant, Colchester, for Roses.

Silver-gilt Banksian Medal.

To Messrs. May, Upper Edmonton, for Ferns.
To Mr. L. R. Russell, Richmond, for trees and shrubs.

Silver Flora Medal.

To Messrs. Bath, Wisbech, for Pæonies &c.
To Mr. J. Box, Haywards Heath, for hardy plants.
To Messrs. Carter, Raynes Park, for Irises.
To Messrs. Cutbush, Highgate, for hardy plants.
To Messrs. Kelway, Langport, for Pæonies and Delphiniums.
To Messrs. J. Veitch, Chelsea, for Pæonies, Cannas, &c.
To Messrs. Wallace, Colchester, for hardy plants.

Silver Banksian Medal.

To Messrs. Barr, Covent Garden, for hardy plants.
To Mr. H. Burnett, Guernsey, for Carnations.
To Mr. J. Douglas, Great Bookham, for Carnations.
To Messrs. Jackman, Woking, for hardy plants.
To Messrs. Jones, Lewisham, for Campanulas &c.
To Messrs. S. Low, Bush Hill Park, for Carnations.
To Messrs. G. Paul, Cheshunt, for Pæonies.
To Mr. A. Perry, Enfield, for hardy plants.
To Mr. M. Prichard, Christchurch, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.
To Messrs. Ware, Feltham, for hardy plants.
To Messrs. Whitelegg and Page, Chislehurst, for hardy plants.

Bronze Flora Medal.

To Messrs. Brown, Peterborough, for hardy plants.
To Messrs. Bunyard, Maidstone, for hardy plants.
To Messrs. Cheal, Crawley, for trees and shrubs.
To Messrs. F. Smith, Woodbridge, for hardy plants.

Bronze Banksian Medal.

To Mr. C. Blick, Hayes, for Carnations.
To Messrs. Fells, Letchworth, for Primulas.
To Guildford Hardy Plant Nursery, Guildford, for hardy plants.
To Mr. F. Lilley, Guernsey, for Sparaxis, Gladioli, &c.
To Mr. R. C. Notcutt, Woodbridge, for hardy plants.
To Messrs. Carter Page, London Wall, for Dahlias, &c.
To Messrs. Peed, Mitcham, for hardy plants.
To Messrs. Phillips and Taylor, Bracknell, for hardy plants.
To Messrs. Piper, Bayswater, for Delphiniums.

Award of Merit.

To *Astilbe* 'Britannia' (votes, unanimous), from Mr. W. Profittlich, Twickenham. A charming plant, growing 3 feet high and bearing plumes of pale rosy-lilac flowers in profusion. It appears to be a vigorous grower, and is the result of a cross between *Astilbe* 'Queen Alexandra' and *A. chinensis.*

To *Blandfordia Cunninghamii* (votes, 10 for, 1 against), from A. Worsley, Esq., Isleworth. An interesting plant belonging to the Liliaceae. It was discovered by the late Allan Cunningham, and is a native of the mountains of New South Wales. The leaves are 1–2 feet long, radical, erect and spreading, bright green above and pale below, narrow and linear. The pendulous flowers are borne on short pedicels, in a terminal umbellate panicle, on a stout scape about 2 feet high. The perianth is conical and about 2 inches long. It is bright orange-scarlet in colour, with golden-yellow segments. The interior of the flower is all yellow.

To Carnation 'Scarlet Gem' (votes, 9 for, 3 against), from

Mr. C. Blick, Hayes. A good scarlet 'Border' variety, with smooth-edged petals and excellent form.

To Carnation 'Thomas à Becket' (votes, 10 for), from Mr. C. Blick, Hayes. A large 'Border' variety, of fine form. The ground colour is pale yellow, suffused with bright rose.

To Gladiolus 'Queen of the Whites,' from Mr. B. Hoogstraten, Sassenheim, Holland. This is an excellent variety, bearing large pure white flowers in a magnificent spike. This award was recommended by a joint committee of the R.H.S. and the Gladiolus Society.

To Pæony 'Gismonda' (votes, 11 for, 3 against), from Messrs. R. H. Bath, Wisbech. A large and very full-flowered variety, of a pale rose-pink colour. It has a very pleasing fragrance, and is said to last well when cut. It is claimed that the plant is a good grower and very free-flowering in habit.

To *Philadelphus* 'Norma' (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. Bain), Dorking. A charming flowering shrub, bearing large, single, creamy-white flowers measuring 2 inches across. The petals are broadly ovate in shape, and the blooms are borne very freely all the way along the shoot.

To Rose 'Mrs. George Norwood' (votes, 14 for), from Mr. E. J. Hicks, Twyford. A new seedling Hybrid Tea, resulting from a cross between 'Frau Karl Druschki' and 'Madame Gabriel Luizet.' It is of splendid form and of a deep rose-pink colour. It has a delicious scent. The fine foliage and the growth resemble the former parent in character.

To Rose 'Paul's Lemon Pillar' (votes, 14 for), from Messrs. Paul, Cheshunt. A beautiful hybrid Noisette pillar rose. The flowers are of lovely shape, pale sulphur-yellow in colour, and have a very pleasing fragrance. The foliage is large and dark green.

To *Saxifraga Brunoniana* (votes, 12 for), from Messrs. Fells, Letchworth. A charming rock plant from the Himalayas. The chief beauty of the plant lies in the numerous long, hair-like, red stolons which almost cover the plant. In sunlight these stolons are particularly attractive. The leaves are small, lanceolate, and arranged in rosettes. The margins are spiny. The flowers are small, deep lemon-yellow in colour, and are borne 3 or 4 inches above the foliage

To *Spiraea Sargentiana* (votes, 10 for, 4 against), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree. A new shrub, raised from seed sent from China by Mr. E. H. Wilson, V.M.H. The plant exhibited was about 3 feet high and of free-branching habit. The flowers were small and sulphury-white in colour. They are borne very freely in small flat corymbs. The leaves are small, dark green in colour, and ovate in shape.

To *Statice Suworowi alba* (votes, unanimous), from Mr. R. C. Notcutt, Woodbridge. The flowers of this very decorative annual plant are white, and are produced in dense, branched spikes. The leaves are radical and oblong-lanceolate in shape.

To Sweet Pea 'Dobbie's Frilled Pink' (votes, unanimous), from

Fig. 147.—Olearia chathamica (*Gard. Chron.*) (p. 388).

Fig. 148.—Salix magnifica. (p. cxxxvii.)

Messrs. Dobbie, Edinburgh. A large flower with crinkled standard and wings. The colour is a delicate and very pretty shade of pale lilac-rose.

To Sweet Pea 'Edith Taylor' (votes, 10 for, 2 against), from Mr. T. Stevenson, Addlestone. A charming deep carmine variety, of large size. The standard is very broad and crinkled. The flowers are borne mostly in fours, and the colour looks particularly well in strong sunlight.

To *Trollius patulus*, Bees' var. (votes, 14 for), from Messrs. Bees, Ltd., Liverpool. A new form, collected in open mountain pastureland on the Kari Pass, Yangtse-Hokong divide, S.E. Tibet, in September 1904, by Mr. G. Forrest. It was found at an altitude of 12,000 feet in latitude 28° N. It grows about 1 foot high, and carries deep yellow single flowers in great profusion. Each bloom measures 2½ inches across and has a bunch of golden anthers. The leaves are three-lobed, serrate, and dark green in colour.

Other Exhibits.

Messrs. Clark, Dover: hardy plants.
Mr. A. Collins, Ashford: Pelargonium.
Messrs. Fairbairn, Carlisle: Delphiniums.
Mr. E. Friar, Sittingbourne: Clematis.
Messrs. Grove, Sutton Coldfield: Dianthus.
Mr. J. Hilling, Enfield: Lobelia 'Mrs. J. Hilling.'
Messrs. Hobbies, Dereham: Roses.
Mary, Countess of Ilchester, Abbotsbury: *Pittosporum grandiflorum* and *Prostanthera lasianthos*, **F.C.C.** 1888.
Mr. H. Newman, Watford: Pink 'Challenger.'
Mr. J. J. Newman, Tooting: Pelargonium 'Galilee.'
Messrs. Reamsbottom, Geashill: Anemones.
Mr. P. van Deursen, Sassenheim: Pæonies and Gladioli.
Wargrave Plant Farm, Ltd., Liverpool Street: hardy plants.
A. Wood, Esq., Sutton Coldfield: *Meconopsis cambrica* 'Tangerine.'

FLORAL COMMITTEE, JULY 1, 1913.

AT HOLLAND HOUSE.

Mr. H. B. MAY, V.M.H., in the Chair, and nineteen members present.

[For Cups and Medals awarded by the Council after consultation with the Judges, see p. cii.]

Awards Recommended:

First-class Certificate.

To *Adiantum trapeziforme* 'Queen Mary' (votes, unanimous), from Messrs. H. B. May, Upper Edmonton. A beautiful plumose sport from the type. The large pinnules are deep pea-green in colour and have their margins prettily fringed. The stems are black and wiry, and reach over two feet in length. The young fronds are especially beautiful, being of a lovely pale green colour.

To *Magnolia Delavayi* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A very handsome new species from Southern China. The plant exhibited was growing in a tub and had reached about 4 feet in height. It carried two large flowers about 6 inches in diameter, with broad, rich cream-coloured petals. The leaves are most attractive. They are evergreen, oval in shape, and measure about 10 inches long by 6 inches broad. The margin is entire, but waved, and the upper surface is dark green and slightly glossy.

Award of Merit.

To *Adiantum Siebertianum* (votes, unanimous), from Messrs. H. B. May, Upper Edmonton. A very elegant new species, having overlapping wedge-shaped pinnules somewhat resembling those of *A. Wiegandii*. It is more slender and graceful in form and is lighter in colour than that form. The young fronds have a delicate reddish tint shading through them which renders them very charming.

To Carnation 'The Baron' (votes, 15 for, 1 against), from Mr. J. Douglas, Great Bookham. A large 'Border' variety, having a clear yellow ground flaked with lilac and rose. The petals are prettily crinkled.

To Carnation 'Virginia' (votes, 10 for), from Mr. J. Douglas, Great Bookham. Another fine 'Border' variety, having a buff ground, suffused and edged with bright rose. The flowers are large and have good non-splitting calyces and smooth-edged petals.

To *Erigeron hybrida* 'Pink Pearl' (votes, 8 for, 4 against), from Mr. A. Perry, Enfield. A very free-flowering hardy plant, growing about 1½ foot high and bearing flowers which measure 1 inch across and have the ray florets rosy-pink and the disc greenish yellow. It is bushy in habit, and the flowers are said to last well in water when cut.

To *Iris Kaempferi* 'Morning Mists' (votes, 10 for, 2 against), from Messrs. Wallace, Colchester. This is probably one of the largest, and most beautiful forms of the Japanese Iris yet introduced. The flowers measure 9 inches across, and have pure white falls 4 inches broad, suffused in the upper half with pale blue, which gradually fades as the flowers develop. The claw of the falls is blotched with greenish-yellow. The standards are white. The foliage is broad and arching, and the plants are of average height.

To *Nepenthes* × *atropurpurea* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A very handsome plant, obtained as the result of a cross between *N. sanguinea* and *N. Curtisii superba*. The pitchers are about 9 inches long, dull crimson, with a pale green interior, blotched with crimson. The rim is broad, ribbed, and of a dark red-crimson colour. The ribs are narrow and ciliated. The plant carried three pitchers.

To *Nepenthes* 'Lewis Bradbury' (votes, unanimous), from Messrs. J. Veitch, Chelsea. This beautiful variety was raised from *N. sanguinea* and *N. mixta*. The magnificent pitchers are large and of

a dull red colour, blotched with deeper shades. The wings are broad and conspicuously fringed, while the interior is much blotched with dull crimson. The rim is broad, ribbed and crimson. This plant had two pitchers.

To *Polypodium Mayi cristatum* (votes, unanimous), from Messrs. H. B. May, Upper Edmonton. A beautiful glaucous fern, having long arching fronds. It is a plumose and crested form of the type.

To Rose 'Mrs. Godfrey Brown' (votes, 8 for, 3 against), from Messrs. Hugh Dickson, Belfast. A very charming pale rosy-pink Hybrid Tea variety, with large flowers of nice shape. It has large, healthy foliage.

To Rose 'Muriel Dickson' (votes, 11 for, 1 against), from Messrs. Hugh Dickson, Belfast. A pretty hybrid Austrian Briar with large semi-double flowers, with broad petals of a rich carmine colour. The large thorns borne by this variety were very noticeable.

To Rose 'Ophelia' (votes, unanimous), from Messrs. W. Paul, Waltham Cross. A charming Hybrid Tea variety, of beautiful shape. The buds are long and pointed, while the petals, which recurve at the margins, are pink, with a slight shading of pale apricot at the base. This is a very fragrant variety.

To Rose 'Ulster Standard' (votes, 11 for, 1 against), from Messrs. Hugh Dickson, Belfast. A deep velvety crimson single Hybrid Tea variety, with very broad petals. The sprays exhibited were covered with buds, indicating a very free-flowering habit.

Other Exhibits.

J. S. Arkwright, Esq., Presteign: *Lychnis* × *Arkwrightii.*

W. Astor, Esq., M.P., Cliveden: Delphinium 'Cliveden Beauty.'

Messrs. Barber, Newcastle-on-Tyne: *Chrysanthemum maximum* 'Queen of the Earlies.'

Messrs. Barr, Taplow: Lobelia 'Cambridge Blue.'

H. Barton, Esq., Antrim: Mimulus 'Cherry Ripe.'

Messrs. Bees, Liverpool: hardy plants.

Burton Hardy Plant Nurseries, Christchurch: *Sedum farinosum.*

Messrs. F. Cant, Colchester: Roses.

Mrs. Denison, Little Gaddesden: Rose 'Countess de Nadalac.'

Mr. W. Easlea, Leigh-on-Sea: Rose 'Cherry Page.'

Mr. Gentle, Little Gaddesden: Sweet Peas.

Messrs. Godfrey, Exmouth: Pelargoniums and *Scabiosa caucasica superba.*

W. W. Gott, Esq., Par Station, Cornwall: Malmaison Carnation 'Improved Duchess of Westminster.'

Messrs. Harkness, Bedale: Poppies and Gaillardias.

Mr. T. R. Hayes, Keswick: *Erica cinerea atrococcinea.*

Mr. H. Hemsley, Crawley: *Inula acaulis* and strain of Alpine Antirrhinums.

Messrs. Jackman, Woking: Clematis 'Mrs. Spencer Castle' and *Tunica Saxifraga alba.*

Messrs. Jones, Lewisham : Pelargonium ' Henry West.'
Messrs. Kelway, Langport : Delphiniums &c.
G. J. Morris, Esq., Hendon : Begonia ' Lady Emily.'
Mr. C. Smith, Guernsey : Gladiolus ' Cleopatra.'
Messrs. Sutton, Reading : new Red Sunflower.
Wargrave Plant Farm, Liverpool St., E.C. : Delphiniums.
Miss Wilmott, V.M.H., Great Warley : *Hydrangea platanifolia.*

FLORAL COMMITTEE, JULY 15, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :

Silver-gilt Banksian Medal.

To Mr. J. Box, Haywards Heath, for hardy plants.

Silver Flora Medal.

To Mr. J. Douglas, Great Bookham, for Border Carnations.
To Messrs. May, Upper Edmonton, for Ferns and Fuchsias.
To Messrs. Smith, Woodbridge, for hardy herbaceous plants.

Silver Banksian Medal.

To Messrs. Bunyard, Maidstone, for hardy plants.
To Messrs. Dobbie, Edinburgh, for Sweet Peas.
To Messrs. S. Low, Bush Hill Park, for Roses.

Bronze Floral Medal.

To Messrs. Clark, Dover, for hardy plants.
To Messrs. Carter Page, London Wall, for Violas and Pelargoniums.
To Mr. M. Prichard, Christchurch, for hardy plants.
To Messrs. Ware, Feltham, for hardy plants.

Bronze Banksian Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.

Award of Merit.

To Carnation ' Bookham White ' (votes, 18 for), from Mr. J. Douglas, Great Bookham. An excellent white ' Border ' variety. The flowers are very full, and the petals broad. The calyx is non-splitting.

To Carnation ' Firefly ' (votes, unanimous), from Mr. James Douglas, Great Bookham. A scarlet ' Border ' variety, of large size and good substance. It is of splendid form, and its calyx does not burst.

To Delphinium ' Mrs. W. J. Sanderson ' (votes, unanimous), from W. J. Sanderson, Esq. (gr. Mr. F. J. Sage), Eastfield Hall, Warkworth. A very pretty dark blue variety. The colour approaches marine blue, with a tint of violet-purple at the edges of the petals. The flowers are single, with a white eye, and are borne very evenly on good bold spikes.

Cultural Commendation.

To Colonel the Right Hon. M. Lockwood, C.V.O., M.P. (gr. Mr. A. Bagg), Bishop's Hall, Romford, Essex, for three plants of *Thladiantha dubia* in fruit.

Other Exhibits.

Messrs. Bolton, Buntingford : Roses.

Messrs. Cannell, Eynsford : Roses and Pelargoniums.

Mr. H. Chipperfield, Foulsham : Pelargoniums.

Mr. H. Crane, Highgate : Violettas.

Messrs. Cutbush, Highgate : greenhouse plants.

Messrs. Fells, Letchworth : rock plants.

Mr. W. H. Gardiner, St. Osyth : *Eschscholzia Mandarin caniculata.*

Mr. J. G. Gerrish, Tring : *Chrysanthemum maximum* 'Mrs. Williams.'

Guildford Hardy Plant Nursery, Guildford : hardy plants.

Messrs. Hobbies, Dereham : Roses.

Mrs. H. Horne, Northampton : Rose 'Mrs. Henry Horne.'

Messrs. Jacobs, Bognor : Carnations.

Miss Kingsford, Fulham : Carnation 'Katharine Wakeford.'

Mr. G. Reuthe, Keston : hardy plants.

Mr. L. R. Russell, Richmond : miscellaneous plants.

G. Shaw, Esq., Burgess Hill : Carnation 'Lady Florence.'

W. Van de Weyer, Esq., Corfe Castle : *Thunbergia Gibsonii*, **A.M.** May 14, 1913 and *Delphinium Van de Weyeri.*

Messrs. J. Veitch, Chelsea : *Meconopsis rudis.*

Mr. H. J. Wheeler, Ilford : Carnations.

FLORAL COMMITTEE, JULY 29, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. A. Perry, Enfield, for Astilbes, Nymphaeas, &c.

Silver Flora Medal.

To Messrs. Jones, Lewisham, for Phloxes.

To Messrs. May, Upper Edmonton, for Ferns.

To Mr. M. Prichard, Christchurch, for hardy plants.

To Mr. L. R. Russell, Richmond, for stove plants and Hydrangeas.

To Messrs. J. Veitch, Chelsea, for Gloxinias and *Thalictrum dipterocarpum.*

Silver Banksian Medal.

To Mr. J. Box, Haywards Heath, for Phloxes and Sweet Peas.

To Messrs. Cutbush, Highgate, for foliage plants and cut flowers.

To Mr. J. Douglas, Great Bookham, for Border Carnations.
To Mr. G. W. Miller, Wisbech, for hardy plants.
To Messrs. Phillips and Taylor, Bracknell, for bog and water plants.
To Messrs. Wells, Merstham, for Phloxes.
To Messrs. Ware, Feltham, for hardy plants.

Bronze Flora Medal.

To Messrs. Baker, Codsall, for Astilbes.
To Mr. G. Reuthe, Keston, for hardy plants.
To Messrs. Sutton, Reading, for Sunflowers.
To Mr. A. Turner, Slough, for Spiræas.

Bronze Banksian Medal.

To Messrs. Carter Page, London Wall, for Violas and Antirrhinums.
To Messrs. W. Paul, Waltham Cross, for Roses.

First-class Certificate.

To Gladiolus 'Electra' (votes, 5 for, 2 against), from Messrs. P. Hopman, Hillegom, Holland. The flowers of this variety are very fine, measuring 4 inches across. The colour is reddish-salmon, while the lower petal has an irregular blotch of cream upon it, and is bright blood-red at the base. The spike is of medium length.

Award of Merit.

To Carnation 'Rosy Morn' (votes, unanimous), from Mr. J. Douglas, Great Bookham. An excellent Border variety, of large size, with smooth-edged petals and a good calyx. The colour is deep rose. The flowers have a faint perfume and are supported on strong stems.

To *Clematis tangutica obtusiuscula* (votes, 14 for, 1 against), from F. C. Stern, Esq., Goring-by-Sea. An interesting climber, collected by Mr. G. Fenwick-Owen in the Chone district, West Kansu, China, in 1911. The seed was sown by the exhibitor in 1912, and the resultant plants flowered out of doors for the first time in 1913. The flowers are single, solitary, about 2 inches across, and golden yellow in colour. The stems of the plant are purplish. The foliage is glabrous, finely divided, with five to seven leaflets, each ternately divided.

To *Dendromecon rigidum* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. Bain), Burford Lodge, Dorking. A remarkable Californian shrub of erect habit, bearing numerous solitary, terminal flowers, measuring $2\frac{1}{2}$ inches across. The four subrotundate crenulate petals are bright buttercup-yellow in colour, while the centre is occupied by numerous orange stamens. The leaves are from 2 to 4 inches long, on short petioles, lanceolate, glabrous, acuminate, rigid, and glaucous green. The plant has proved hardy at Dorking, and is there given a position and treatment similar to that afforded to *Romneya Coulteri*.

To Gladiolus 'Frank Paddleton, Jr.' (votes, 5 for, 1 against), from Firma P. Vos Mz., Sassenheim, Holland. A very large, pretty variety, with deep rose flowers, heavily blotched with reddish-crimson. The spike is of medium size.

To Gladiolus 'Incontestable' (votes, unanimous), from Messrs. Alkemade, Noordwijk, Holland. A magnificent variety, white in colour, with a blood-red blotch at the base of the petals. Spike good.

To Gladiolus 'King of the Blues' (votes, 6 for, 3 against), from Mr. K. Velthuys, Hillegom, Holland. A very striking variety, bearing very dark violet flowers on a medium spike.

To Gladiolus 'Liebesfeuer' (votes, unanimous), from Mr. de Ruyter, Noordwijk. A grand scarlet variety, borne on a long spike.

To Gladiolus 'Loveliness' (votes, unanimous), from Mr. de Ruyter, Noordwijk. A very large pale sulphury-white variety. The middle lower petal is deeper, and is streaked with light crimson. The flowers are borne in a good bold spike.

To Gladiolus 'Pink Perfection' (votes, unanimous), from Messrs. P. Hopman, Hillegom. A lovely apple-blossom pink variety, having the margins of the petals flaked with salmon, and the bases crimson. The spikes are of moderate length.

To Gladiolus 'Prince of Wales' (votes, unanimous), from Mr. van Zanten, Hillegom. A charming orange-salmon variety, having the lower petals blotched with pale yellow, and tinged with crimson at the base. Spikes good.

To Gloxinia 'Veitch's Strain' (votes, unanimous), from Messrs. J. Veitch, Chelsea. A magnificent strain, producing very large flowers in great profusion. The colours are very fine, including white, various shades of pink, crimson, violet, violet-purple and deep purple. In some cases the throats are white and in others spotted. The plants exhibited were raised from seed sown in January, and thus they were only six months old.

To *Nymphaea colossea* (votes, unanimous), from Leopold de Rothschild, Esq., C.V.O. (gr. Mr. J. Hudson, V.M.H.), Gunnersbury House, Acton. As its name denotes, this is a very large-flowered variety, and its remarkable vigour renders it especially suitable for large expanses of water, where it can be allowed plenty of room to develop. The flowers measure 9 inches or more across, and the petals are sulphury-white, delicately shaded at the base with rose-pink. The flowering season extends from early spring until the end of October.

To *Nymphaea* 'Escarboucle' (votes, unanimous), from Leopold de Rothschild, Esq., C.V.O. (gr. Mr. J. Hudson, V.M.H.), Gunnersbury House, Acton. A very beautiful variety, measuring about 6 inches across, remarkable for its intense vermilion colour, which is uniform throughout the petals and quite a unique shade in Water-Lilies. The plant is a good grower and flowers freely.

To Rose 'Annie Crawford' (votes, unanimous), from Mr. W. R. Hammond, Grovelands, Burgess Hill, Sussex. A new seedling H. P. from 'Captain Hayward' and 'Mrs. Sandford,' raised by Dr. Campbell Hall. The flowers are large, of perfect form, deep rose-pink, very slightly scented.

To *Spiraea arborea grandis* (votes, unanimous), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree. This handsome plant

was exhibited under the name of *Sorbaria*, and was raised from seed sent from China by Mr. E. H. Wilson, V.M.H. The flowers are creamy-white, and are disposed in large graceful panicles. The leaves are large, pinnate; leaflets opposite, lanceolate, dark green.

To Sweet Pea 'Dobbie's True Lavender' (votes, 9 for, 2 against), from Messrs. Dobbie, Edinburgh. A very fine pale lavender-blue variety, with large flowers, borne mostly in threes on stout stalks. The standards are prettily crinkled.

To Sweet Pea 'King White' (votes, 13 for), from Messrs. Dobbie, Edinburgh. A large milk-white variety, borne mostly in fours. The standard is very broad and crinkled.

To Sunflower 'Sutton's New Red' (votes, 11 for, 5 against), from Messrs. Sutton, Reading. This interesting annual was obtained as the result of a cross between *Helianthus lenticularis coronatus* and *Helianthus annuus*, made by Professor Cockerell, of Bolder University, Colorado, U.S.A. The conspicuous disc is surrounded by a broad band of chestnut-red, which is circled by deep golden yellow. The diameter of the bloom is about 6 inches. (Fig. 149.)

NOTE.—All the above awards to Gladioli were recommended by a joint Committee of the R.H.S. and the Gladiolus Society.

Other Exhibits.

Messrs. Cheal, Crawley: Roses and miscellaneous plants.

Messrs. Fells, Letchworth: rockery.

Guildford Hardy Plant Nursery, Guildford: hardy plants.

Mr. W. F. Hamilton, Lymington: *Sorbaria arborea.*

Mr. C. A. Jardine, Holt: Violas.

Messrs. Kelway, Langport: *Chrysanthemum leucanthemum* 'Antarctic.'

Messrs. Michie, Alnwick: Pink 'Mrs. Beckett Clayhills.'

Mr. H. W Monington, Horley: *Viola cornuta* 'Mary Glynne.'

D. S. Pring, Esq., Newport: Geranium 'Lady Godfrey Baring.'

G. Shaw, Esq., Burgess Hill: Carnations.

Mr. A. L. Smith, Catford: Carnation 'Caviare.'

FLORAL COMMITTEE, AUGUST 12, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Kelway, Langport, for Gladioli.

Silver-gilt Banksian Medal.

To Mr. M. Prichard, Christchurch, for hardy plants.

Silver Flora Medal.

To Messrs. Vert, Saffron Walden, for Hollyhocks.

FIG. 149.—NEW RED SUNFLOWER. (*Sutton.*) (p. cxlviii.)

[*To face p.* cxlviii.

FIG. 150.—ODONTOGLOSSUM × 'OTHMARSCHEN.' (p. clv.)

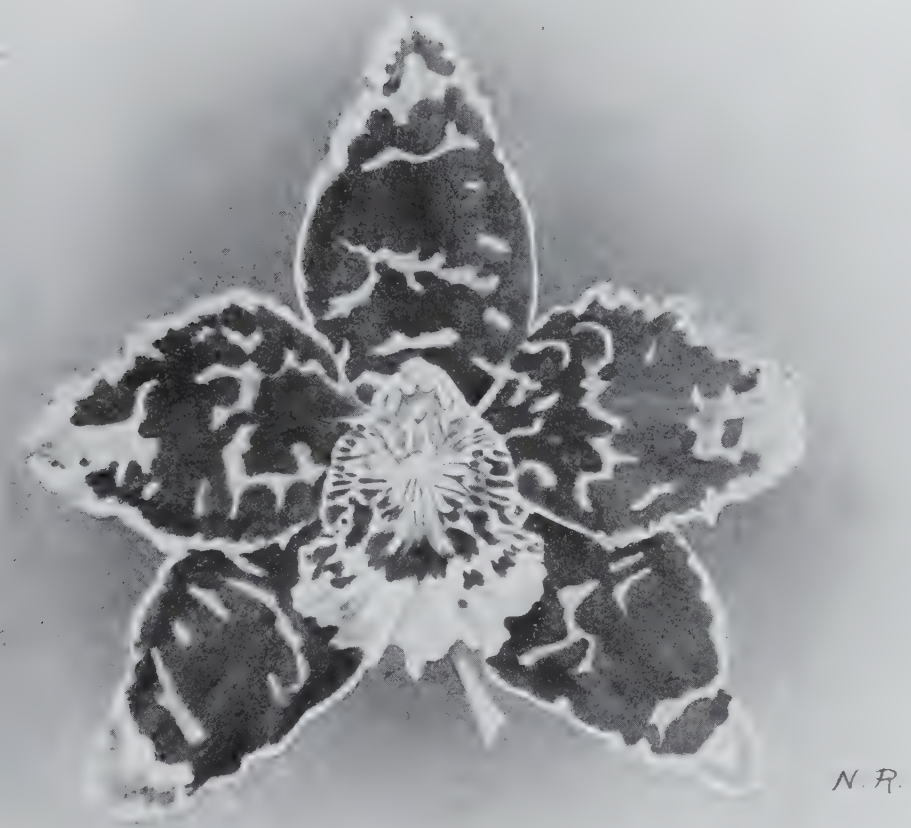


FIG. 151.—ODONTOGLOSSUM × 'QUEEN OF GATTON.' (p. clv.)

FIG. 152.—ODONTIODA × 'CHANTICLEER.' (p. clv.)

[*To face p.* cxlix.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for Gladiolus and miscellaneous plants.

To Messrs. Dobbie, Edinburgh, for Dahlias and Scabious.

To Messrs. May, Upper Edmonton, for Ferns.

To Messrs. Ware, Feltham, for hardy plants.

To Messrs. Wells, Merstham, for Phloxes &c.

Bronze Flora Medal.

To Mr. A. Perry, Enfield, for Delphiniums &c.

To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Banksian Medal.

To Messrs. Cole, London, for Pelargoniums &c.

Award of Merit.

To *Agapanthus inapertus* (votes, unanimous), from A. Worslev, Esq., Isleworth. A charming and very distinct variety, having drooping tubular flowers measuring 2 inches long, borne in large umbels. The colour approaches Dauphin's blue. The pedicels measure 1½ inch in length, and are green, tinted with blue. (See p. 363.)

To Caladium 'Madame René Marot' (votes, 10 for, 1 against), from R. Hoffmann, Esq. (gr. Mr. T. Tomlinson), Streatham, S.W. A very handsome variety, with medium-sized leaves, having an old-rose ground, mottled with varying shades of pink; veins bright carmine; edges spotted with green.

To Dahlia 'Dungeness' (votes, 13 for, 1 against), from Messrs. Dobbie, Edinburgh. A good variety of the 'Collarette' type, having broad, bright scarlet florets, and a collar of deep yellow. The diameter of the flowers is 5 inches.

To Gladiolus 'Craiganour' (votes, unanimous), from Messrs. Kelway, Langport. Flowers large, of fine form, rich salmon-carmine, tinged with crimson in the lower petals, which also have a white streak in the middle. Spike good and well furnished with blooms.

To *Lysionotus warleyensis* (votes, 10 for, 1 against), from Miss Willmott, F.L.S., V.M.H. (gr. Mr. Fielder, V.M.H.), Great Warley. A charming dwarf shrub belonging to the Gesneraceae, introduced from China by Mr. E. H. Wilson, V.M.H. The flowers resemble those of a Pentstemon in shape, and measure 1¾ inch long. They are white in colour, streaked with dull crimson inside the tube, along which run two pale yellow ridges. The leaves are oblong-lanceolate, serrate, having the margins tinted with crimson. The plant exhibited was not more than 9 inches in height. Its hardiness in this country has not yet been tested.

Other Exhibits.

Messrs. Artindale, Sheffield: *Bidens dahlioides.*

Messrs. Baker, Codsall: Phlox.

A. W. Chaplin, Esq., Great Amwell: *Saxifraga florulenta*, **F.C.C.** 1872.

Lady Catherine Milnes Gaskell, Much Wenlock: *Dianthus* 'Wenlock Delight.'

Messrs. Hurst, Houndsditch: Marigold 'Meteor' and a pure white Nigella 'Miss Jekyll.'

Messrs. Jones, Lewisham: Phlox 'Mrs. H. J. Jones.'

Sir Trevor Lawrence, Bart., Dorking: Antirrhinum 'Purple King' and *Platycodon grandiflorum semi-duplex*, **F.C.C.** 1900.

Mr. W. Murdy, Warkworth: Pelargonium 'Mrs. Deuchar.'

F. W. Platt, Esq., Highgate: Viola 'Ken View Seedling' and Carnation 'Mrs. F. W. Platt.'

Mr. J. Rochester, Hurstgreen: Carnations.

Mr. L. R. Russell, Richmond: flowering shrubs &c.

Rev. H. A. Soames, Bromley: Carnation 'Lyncroft.'

Messrs. Stark, Great Ryburgh: Sweet Peas.

N. Turner, Esq., Welshpool: Calceolarias.

Lady Harriet Warde, Tonbridge: Carnations.

Mr. W. Wilkinson, Bishop Stortford: Phloxes.

FLORAL COMMITTEE, AUGUST 26, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and eighteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. J. Box, Haywards Heath, for Phloxes &c.

To Messrs. Kelway, Langport, for Gladioli.

Silver-gilt Banksian Medal.

To Messrs. Blackmore & Langdon, Bath, for Begonias.

To Messrs. Ware, Feltham, for Begonias and hardy plants.

Silver Flora Medal.

To Messrs. Dobbie, Edinburgh, for Dahlias.

To Mr. A. F. Dutton, Iver, for Carnations.

To Messrs. Wallace, Colchester, for Montbretias.

Silver Banksian Medal.

To Messrs. Carter Page, London Wall, for Dahlias.

To Messrs. Cutbush, Highgate, for Gladioli, Pentstemons, &c.

To Mr. A. H. Gwillim, Sidcup, for Begonias and hardy plants.

To Messrs. May, Upper Edmonton, for ferns and miscellaneous plants.

To Messrs. Wells, Merstham, for Phloxes.

To Messrs. Whitelegg & Page, Chislehurst, for hardy plants.

Bronze Flora Medal.

To Messrs. Barr, Covent Garden, for hardy plants.

To Monsieur Jules Ragot, Paris, for Gladioli.

Bronze Banksian Medal.

To Messrs. Cheal, Crawley, for Dahlias.
To Messrs. Piper, Bayswater, for Dahlias.
To Mr. L. R. Russell, Richmond, for hardy Heaths.

Award of Merit.

To Chrysanthemum 'Improved Northern Star' (votes, unanimous), from Messrs. Dobbie, Edinburgh. A very useful hardy annual. The flowers are large and measure 3½ inches across. The ray florets are white, and the dark disc is surrounded by a narrow ring of yellow. The flowers are borne in great profusion on very strong stems.

To Dahlia 'Aphrodite' (votes, unanimous), from Mr. C. Turner, Slough. A Pæony-flowered variety, having very wide, sulphury-white ray florets, surrounding a small golden-yellow disc. The flowers are 6 inches in diameter, and are borne on very strong, erect stems. A very useful variety for garden decoration or for cutting.

To Dahlia 'Lily Reed' (votes, 6 for), from Mr. H. Shoesmith, Woking. A beautiful Cactus variety of nice form, with slightly twisted florets. The colour is very deep yellow.

To Dahlia 'Prince of Orange' (votes, 6 for), from Messrs. Dobbie, Edinburgh. This is one of the best of the Collarette type yet introduced. The colour is reddish-orange, and the collar is of the same shade, but a little paler, while the reverse of the petals is buff. The flowers measure 5 inches across and are carried on strong stems.

To Dahlia 'Regulus' (votes, unanimous), from Messrs. Cheal, Crawley. A very neat, compact, and distinct Pompon variety. It is purplish-crimson in colour.

To Dahlia 'Tusca' (votes, 6 for, 1 against), from Messrs. Dobbie, Edinburgh. A useful Collarette variety, having the ray florets very bright crimson, tipped with white. The golden-yellow centre is surrounded by a band of yellow. The small florets forming the collar are sulphury-white. The flowers measure 5 inches across and are supported on stiff stems.

To Gladiolus 'Lady Faire' (votes, unanimous), from Messrs. Kelway, Langport. Flowers very wide, white; lower petals heavily blotched with crimson. Spike medium.

To Gladiolus 'Lady Northcote' (votes, unanimous), from Messrs. Kelway, Langport. Flowers large, amber-yellow, heavily suffused and flaked with salmon, especially at the margins. The middle lower petal is slightly streaked with crimson at the base.

To Gladiolus 'Mrs. Bromet' (votes, unanimous), from Messrs. Kelway, Langport. Flowers, pale amber-yellow, slightly tinged with salmon at the edges. The middle lower petal is a little deeper in colour, and is tinged with crimson at the base. Spike good.

To Montbretia 'Queen Adelaide' (votes, unanimous), from Sydney Morris, Esq. (gr. Mr. G. Henley), Earlham Hall, Norwich. A very beautiful variety, resulting from a cross between 'George Henley' and 'Prometheus.' The flowers are slightly over 3 inches in width

and are of a deep reddish-orange colour, which shades to pure orange at the base of the petals, where a brown blotch occurs. It is said to be a good grower, and flowered for the first time in 1911.

To Rose 'Mrs. Andrew Carnegie' (votes, 8 for, 1 against), from Messrs. Cocker, Aberdeen. A beautiful H. T. of great size and good substance, obtained as the result of a cross between 'Frau Karl Druschki' and 'Niphetos,' the latter being the pollen parent. The colour is white, faintly tinted with lemon. The flowers possess a very pleasing fragrance and have very deep petals.

To *Scabiosa caucasica magnifica* (votes, unanimous), from Messrs. Cocker, Aberdeen. A very fine hardy plant, producing an abundance of very pretty light-bluish flowers suitable for cutting. The blooms measure 3 inches across, and are supported on very strong and stiff stems. The pale violet-mauve anthers contrast very pleasingly with the general colour.

The above awards to Dahlias were made by a Joint Committee of members of the R.H.S. Floral Committee and members of the National Dahlia Society.

Other Exhibits.

Mme. La Duchesse Sarah Burgess, Beddington: Petunias.
Mr. W. F. Hamilton, Lymington: *Crotalaria agatiflora.*
Messrs. S. Low, Bush Hill Park: *Chironia ixifera.*
Messrs. Van Meerbeek, Hillegom: Gladiolus 'White Giant.'
Mr. A. Perry, Enfield: Achilleas and Delphiniums.
Major Pitt, Charing: Carnation 'Mrs. Inez Pitt.'
Mr. G. Reuthe, Keston: hardy plants.
Mr. J. B. Riding, Chingford: Dahlia 'Countess Beauchamp.'
Mr. N. C. Shiach, Helensburgh: *Spartium junceum.*
Messrs. Stredwick, St. Leonards: Dahlias.
Messrs. J. Veitch, Chelsea: Streptocarpus.
Wargrave Plant Farm, Twyford: *Gentiana Kurroo.*
Miss Willmott, F.L.S., Great Warley: *Origanum Tournefortii.*

FLORAL COMMITTEE, AUGUST 29, 1913.

SUB-COMMITTEE AT WISLEY.

Mr. H. B. MAY, V.M.H., in the Chair, and seven members present.

Awards Recommended:—

Award of Merit.

To the following Antirrhinums:

Nos. 3, 4, 'Amber Queen'; No. 12, 'Beacon'; No. 13, 'Beauty'; Nos. 17, 18, 'Bonfire'; No. 37, 'Carmine Queen'; No. 41, 'Coccinea': No. 56, 'Crimson King'; No. 67, 'Daphne'; No. 69, 'Defiance'; No. 80, 'Fire King'; No. 89, 'Golden Morn'; No. 90, 'Golden Queen'; No. 104, 'Maize Queen'; No. 111, 'Moonlight'; No. 122, 'Pink'; No. 135, 'Queen Victoria'; No. 149, 'Rosy Morn'

No. 151, 'Salmon Pink'; No. 164, 'Sunset'; No. 178, 'White Beauty'; No. 182, 'White Queen'; No. 185, 'Yellow'; No. 186, 'Yellow King'; No. 193, 'Yellow Queen.'

Highly Commended.

No. 1, 'Albino'; No. 21, 'Brilliant'; No. 24, 'Brilliant Rose'; No. 30, 'Buff Queen'; No. 45, 'Coral Red'; No. 58, 'Dainty'; No. 63, 'Dainty Queen'; No. 82, 'Firelight'; No. 83, 'Galatea'; No. 112, 'Nobile'; No. 126, 'Pink Beauty'; No. 128, 'Pink Queen'; No. 145, 'Roseum'; No. 156, 'Scarlet Carmine'; No. 183, 'White Queen'; No. 189, 'Yellow Prince.'

For descriptions see Reports of the Wisley Trials.

ORCHID COMMITTEE.

MAY 14, 1913.

Mr. J. GURNEY FOWLER in the Chair, and eleven members present.

Awards Recommended :—

Silver Flora Medal.

To Sir Geo. H. Kenrick, Whetstone, Edgbaston, Birmingham (gr. Mr. Macdonald), for finely-flowered plants of *Dendrobium Dalhousieanum* propagated from a small original plant.

Award of Merit.

To *Brassolaeliocattleya* × *Veitchii*, The Dell variety (*B.-c.* × *Digbyano-Mossiae* × *L. purpurata*) (votes unanimous), from Baron B. Schröder (gr. Mr. J. E. Shill). Sepals and petals silver-white, tinged with rose. Lip broad, fringed, deep rose-purple, with yellow disc.

To *Laeliocattleya* × *Fascinator-Mossiae*, Burford variety (*L.-c.* × 'Fascinator' × *C. Mossiae* (votes unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O., Burford (gr. Mr. W. H. White). Flower of good shape, white, with the front of the lip violet-purple, and a spot of the same colour on the tips of the petals.

To *Odontoglossum* × 'Phoebe' *splendens* (*cirrhosum* × *crispum*) (votes unanimous), from Messrs. McBean, Cooksbridge. A large form with white flowers blotched with red.

Botanical Certificate.

To *Lissochilus streptopetalus*, from William Van de Weyer, Esq., Corfe Castle. The plant bore eight spikes 4 feet high, with numerous yellow flowers with greenish sepals striped with brown. Collected in N'gongo Hills, British East Africa, alt. 8300 feet. Figured as *Eulophia streptopetala*.

Cultural Commendation.

To Mr. C. J. Salter, gr. to the Right Hon. Lord Lawrence, Chetwode Manor, Buckingham, for *Dendrobium Dalhousieanum* with many spikes.

To Mr. Macdonald, gr. to Sir Geo. H. Kenrick, Whetstone, Birmingham, for *Dendrobium Dalhousieanum*.

To Mr. Branch, gr. to W. R. Lee, Esq., Heywood, for *Dendrobium Falconeri* with 200 flowers.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., for a finely flowered *Brassocattleya* × *nivalis*.

Other Exhibits.

Sir Trevor Lawrence, Bart., K.C.V.O.: rare hybrids.
Pantia Ralli, Esq.: *Odontioda* × *Sanderae*.
W. R. Lee, Esq.: *Cypripedium* × 'Pavlova.'

A. Harrison, Esq. : Odontoglossums.
The Liverpool Horticultural Co. : group.
Messrs. McBean : Odontiodas.

ORCHID COMMITTEE, MAY 20, 1913.

AT CHELSEA.

Sir HARRY J. VEITCH in the Chair, and twenty-three members present.

[For Cups and Medals awarded by the Council after consultation with the Judges, see p. xciv.]

Awards Recommended :—

First-class Certificate.

To *Odontoglossum* × 'Othmarschen' (parentage unrecorded) (votes 14 for, 6 against), from Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill). Flowers large and of fine shape, bearing large claret blotches, the white ground colour appearing in thin wavy lines. (Fig. 150.)

To *Laeliocattleya* × 'Britannia,' Westonbirt variety (*L.-c.* × *Canhamiana* × *C. Warscewiczii*) (votes, 10 for, 3 against), from Lieut.-Colonel Sir George L. Holford, K.C.V.O. (gr. Mr. H. G. Alexander). Sepals and petals rosy-lilac, the trumpet-shaped labellum claret-red.

To *Odontoglossum* × 'Queen of Gatton' (*triumphans* × *percultum*) (votes, unanimous), from Sir Jeremiah Colman, Bart., Gatton Park (gr. Mr. Collier). Flowers large and finely formed, yellow, closely blotched with red-brown. (Fig. 151.)

To *Laeliocattleya* × 'Frederick Boyle,' Gatton variety (*L. anceps* 'Stella' × *C. Trianae*) (votes, unanimous), from Sir Jeremiah Colman, Bart. Flower blush-white. Near to the variety *Kerchoveae*.

To *Odontioda* × 'Chanticleer,' Orchidhurst variety (*Odontioda* × *Cooksoniae* × *C. Noezliana*) (votes, unanimous). A brilliant scarlet flower of fine shape. (Fig. 152.)

To *Laeliocattleya* × 'Sylvia' var. 'Princess Victoria Louise' ('Ascania' × 'Hippolyta Phoebe') (votes, unanimous), from Messrs. Charlesworth. Sepals and petals chrome-yellow. Front of lip rosy-crimson.

To *Miltonia* × *Charlesworthii* (*vexillaria* 'Memoria G. D. Owen' × *Hyeana*) (votes, unanimous), from Messrs. Charlesworth. Practically a large rose-pink form of 'G. D. Owen.'

To *Cattleya* × 'Empress Frederick' *alba* (*Dowiana aurea* × *Mossiae Reineckiana*) (votes, unanimous), from Messrs. Mansell and Hatcher, Rawdon, Yorks. Flowers white, with deep yellow labellum.

Award of Merit.

To *Laeliocattleya* × 'Ganymede,' Holford's variety (*L.* × 'Latona' × *C. Schroderae*) (votes, unanimous), from Lieut.-Colonel Sir George L. Holford, K.C.V.O. Flowers copper-yellow, with ruby front to the lip.

To *Odontoglossum* × *illustrissimum*, Westonbirt variety (*Lambeauianum* × *ardentissimum*) (votes, unanimous), from Lieut.-Col. Sir Geo. L. Holford, K.C.V.O. The large blooms were claret colour with a gold tint and blush-white tips to the segments.

To *Odontoglossum* × *eximium Armstrongiae* (*ardentissimum* × *crispum*, blotched variety) (votes, unanimous), from Messrs. Armstrong & Brown, Tunbridge Wells. A model flower, white, with the inner halves of the segments deep violet.

To *Odontoglossum* × *Georgius Rex* (parentage unrecorded) (votes, unanimous), from Messrs. Charlesworth. Flowers heavily blotched with claret colour, margin white.

To *Laeliocattleya* × 'Aphrodite,' Orchidhurst variety (*L. purpurata* × *C. Mendelii*) (votes, unanimous), from Messrs. Armstrong & Brown. Flowers rose-pink with rich, ruby-crimson lip.

To *Brassolaeliocattleya* × *excelsior* (*L.-c.* × 'Geo. Woodhams' × *B. Digbyana*), from Messrs. Armstrong & Brown. Lip deep claret-crimson, petals rose colour.

To *Oncidium* × *McBeanianum* (*superbiens* × *macranthum*) (votes, unanimous), from Messrs. McBean, Cooksbridge. An interesting cross. Sepals olive-brown, petals yellow spotted with red-brown.

To *Odontioda* × *Charlesworthii* var. 'Perfection' (*O. Harryanum* × *C. Noezliana*) (votes, 13 for, 1 against), from Messrs. McBean. Flower large, dark red.

To *Brassocattleya* × *Vilmoriniana* var. 'Etna' (*B.-c.* × 'Mrs. J. Leemann' × *C. Mossiae*) (votes, 15 for, 1 against), from Messrs. Sander, St. Albans. Sepals and petals rose, white at the base. Lip fringed, tinged with lilac.

To *Odontonia* × 'Laelia Sander' (*Miltonia Warscewiczii* × *Odontoglossum* × *amabile*) (votes, unanimous), from Messrs. Sander. Inflorescence erect, branched, flowers reddish purple, the outer parts of the segments blush-white.

To *Oncidioda* × *Cooksoniae illustris* (*O. macranthum* × *C. Noezliana*) (votes, 14 for, 2 against), from Messrs. Sander. Flowers as large as those of *Oncidium macranthum*. Dark red.

To *Odontioda* × *chelseiensis* var. 'St. Fuscien' (*C. vulcanica* × *O. crispum*) (votes, 10 for, 3 against), from Monsieur H. Graire, Amiens. A larger rosy-lilac form of the type shown in 1909.

Cultural Commendation.

To Mr. H. G. Alexander, Orchid grower to Lieut.-Col. Sir Geo. L. Holford, K.C.V.O., for specimens of *Miltonia vexillaria* 'Snowflake' (15 spikes, 85 flowers), and *M. vexillaria virginale* with 25 blooms.

To Mr. H. G. Alexander for a fine specimen of *Cattleya Mossiae* 'Mahomet.'

To Mr. J. Davis, gr. to J. Gurney Fowler, Esq., for *Sobralia macrantha alba* with 45 large white flowers.

FIG. 153.—MILTONIODA × HARWOODII, FOWLER'S VARIETY. (p. clix.)

[*To face p.* clvi.

Fig. 154.—Odontioda × Brewii. (p. clix.)

Other Exhibits.

Lieut.-Col. Sir Geo. L. Holford: hybrids.

Sir Jeremiah Colman, Bart.: Odontiodas.

W. P. Burkinshaw, Esq., Hessle, Hull: *Miltonia* × *Bleuana* and white *Cattleya Luddemanniana*.

Mr. John Evans, Congleton: two new Odontoglossums.

Monsieur Jules Hye de Crom, Ghent: hybrid Miltonia.

ORCHID COMMITTEE, JUNE 3, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended:—

Gold Medal.

To H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. G. E. Day), for a very fine group.

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for showy hybrids, and rare species.

To Messrs. Sander, St. Albans, for Odontoglossums, Cattleyas and Laeliocattleyas.

Silver Banksian Medal.

To E. H. Davidson, Esq., Twyford, for rare Orchids.

To Messrs. J. Cypher, Cheltenham, for a group.

To Messrs. Charlesworth, Haywards Heath, for rare species and hybrids.

To Messrs. Stuart Low, Enfield, for a group.

To Messrs. Hassall, Southgate, for a group.

Bronze Banksian Medal.

To Messrs. W. Baylor Hartland, Cork, for a small group.

Award of Merit.

To *Odontoglossum* × 'Aireworth,' Orchid Dene variety (*crispum* × *Lambeauianum*) (votes, unanimous), from E. H. Davidson, Esq., Orchid Dene, Twyford. Flower large and finely formed, the inner parts of the segments blotched dark red, the outer coloured rose. Lip white with red markings.

To *Odontoglossum* × *Lairessei* (*Edwardii* × *Cervantesii*) (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). Inflorescence branched, flowers claret-red with white tips.

To *Odontoglossum* × 'Neptune' var. 'St. Fuscien' (*crispum* × *nebulosum*) (votes, 15 for, 1 against), from Monsieur H. Graire, Amiens. Flowers white, effectively blotched with purple.

Cultural Commendation.

To Mr. W. Smith, gr. to Albert Pam, Esq., Malting Farm, Little Hallingbury, Bishop Stortford, for a fine specimen of *Cattleya Mossiae* with about 100 flowers and buds.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., K.C.V.O., for *Epidendrum organense* with 18 tufts of small flowers.

Other Exhibits.

Sir Jeremiah Colman, Bart.: Catasetums.

Sir Trevor Lawrence, Bart., K.C.V.O.: Laeliocattleyas.

Francis Wellesley, Esq.: *Laeliocattleya* × 'Lady Roberts' (*L.-c.* 'Euphrosyne' × *C. Dowiana aurea*).

Pantia Ralli, Esq.: *Odontoglossum* × 'Aireworth.'

Ernest G. Mocatta, Esq.: *Odontoglossum* × 'Jasper.'

J. Gurney Fowler, Esq.: *Odontoglossum crispum* 'Ruth.'

R. Brooman White, Esq.: Odontoglossums.

Mr. H. Dixon: *Cattleya Mossiae imperialis.*

Mr. C. F. Waters: Cattleyas.

ORCHID COMMITTEE, JUNE 17, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended :—

Silver Banksian Medal.

To H. S. Goodson, Esq., Putney (gr. Mr. G. E. Day), for hybrid Odontoglossums.

To Mr. S. W. Flory, Tracy's Orchid Nursery, Twickenham, for showy Cattleyas and Laeliocattleyas.

To Messrs. Charlesworth, Hayward's Heath, for a group.

To Messrs. Stuart Low, Enfield, for a group.

To Messrs. Hassall, Southgate, for Cattleyas.

Award of Merit.

To *Odontoglossum crispum* 'The Baroness' (votes, unanimous), from Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill). One of the largest and most perfectly shaped forms. Flowers white, blotched with light violet and tinged with purple at the back.

To *Cattleya Gaskelliana* 'Fairy Queen' (votes, unanimous), from Baron Bruno Schröder. A clear white variety, with yellow disc to the lip, in front of which is a faint pearly flush.

To *Oncidioda* × 'Bella' (*Oncidium Marshallianum* × *Cochlioda Noezliana*) (votes, unanimous), from Messrs. Charlesworth. An interesting hybrid with the form and colouring of *Oncidium Marshallianum*—yellow, with red-brown markings on the inner parts of the segments.

Cultural Commendation.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., K.C.V.O., for a fine specimen of *Dendrobium Victoriae-reginae* with many blue and white flowers.

To Mr. J. Davis, gr. to J. Gurney Fowler, Esq., for *Odontioda* × *Cooksoniae*, Fowler's variety.

Other Exhibits.

Baron Bruno Schröder: two fine forms of *Cattleya Warscewiczii.*

J. Gurney Fowler, Esq.: *Lycaste* × *Imschootiana* (*cruenta* × *Skinneri*).

Francis Wellesley, Esq.: *Cattleya Mendelii* 'His Majesty the King.'

Sir Mervyn Buller: *Laeliocattleya* × *Martinetii.*

Mr. E. V. Low: Cattleyas and Laeliocattleyas.

Orchid Committee, July 1, 1913.

At Holland House.

Sir Harry J. Veitch in the Chair, and twenty-six members present.

[For Cups and Medals awarded by the Council after consultation with the judges, see p. cii.]

Awards Recommended:—

First-class Certificate.

To *Miltonioda* × *Harwoodii*, Fowler's variety (*Miltonia vexillaria* 'Empress Augusta Victoria' × *Cochlioda Noezliana*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). Flowers twice the size of those of the variety which secured an Award of Merit October 8, 1912; bright cerise-rose, with yellow crest to the lip. (Fig. 153.)

To *Miltonia* × *Sanderae* (St. André' × *vexillaria* 'Memoria G. D. Owen') (votes, unanimous), from Messrs. Sander, St. Albans. A clear white flower with a delicate rose-pink flush, and a nearly black mask at the base of the lip.

To *Odontioda* × *Brewii* (*Odontioda Charlesworthii* × *Odontoglossum Harryanum*) (votes, 13 for, 0 against), from Messrs. Charlesworth, Haywards Heath. Flower larger than *O. Charlesworthii*, dark bronzy-red with a yellow crest of seven ridges. (Fig. 154.)

Award of Merit.

To *Cattleya Mossiae* 'Dreadnought' (votes, unanimous), from Messrs. Sander. A massive flower with petals 4 inches in width, deep rose-pink, with violet-purple veining and blotching on the lip.

To *Cattleya Mossiae* 'Olympia' (votes, 12 for, 3 against), from

Messrs. Charlesworth. Sepals and petals blush-white, tinged and veined rose. Lip broad, mottled with purple.

To *Odontioda* × *Wilsonii* 'The President' (*Cochlioda vulcanica* × *Odontoglossum Pescatorei*) (votes, unanimous), from Messrs. Charlesworth. Habit of *O. Pescatorei*. Inflorescence branched. Flowers white, densely spotted with purple.

To *Cattleya* × 'Magnet' var. 'Serenata' (*Whitei* × *Mossiae*) (votes, 9 for, 2 against), from Messrs. Mansell & Hatcher. Flowers resembling *C. labiata*, rose, with reddish-purple front to the lip.

Cultural Commendation.

To Messrs. Charlesworth, for *Grammangis Ellisii* with two spikes of sixty-four flowers.

To Mr. Collier, gr. to Sir Jeremiah Colman, Bart., for *Odontioda* × *Bradshawiae* with two branched spikes of dark scarlet flowers.

Other Exhibits.

Sir Jeremiah Colman, Bart.: *Sobralia Colmanae.*
J. Gurney Fowler, Esq.: *Odontioda Lambeauiana.*
Monsieur Jules Hye de Crom: hybrid Miltonias.
W. Waters Butler, Esq.: Cattleyas.
Messrs. Jas. Veitch: hybrid Orchids.
Mr. E. V. Low: *Cattleya Mendelii Lambeauiana.*
Messrs. Sander: new hybrids.

ORCHID COMMITTEE, JULY 15, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for a group, principally of interesting species.

To Messrs. Charlesworth, Haywards Heath, for a group.

To Messrs. Stuart Low, Enfield, for a group.

First-class Certificate.

To *Dendrobium Dearei*, McBean's variety (votes, 14 for, 1 against), from Messrs. McBean, Cooksbridge. Flowers much larger than the ordinary form; snow-white.

Award of Merit.

To *Odontioda* × *Thwaitesii* 'Purple Emperor' (*O. Harryanum* × *C. vulcanica*) (votes, 15 for, 2 against), from E. H. Davidson, Esq., Orchid Dene, Twyford. Flowers large and with broad segments, bronzy-purple, with white freckling on the lip.

To *Odontioda* × *Cooksoniae venusta* (*O.* × *ardentissimum* × *C. Noezliana*) (votes, unanimous), from Lieut.-Col. Sir Geo. L. Holford, K.C.V.O., Westonbirt (gr. Mr. H. G. Alexander). A large brilliant red flower of fine shape. Front of the lip blush-white, crest yellow.

To *Paphinia cristata* (votes, unanimous), from Messrs. Charlesworth. Plant dwarf with short spikes of one or two flowers, each 4 inches across, claret-red, with white lines and a tuft of white hairs on the lip. First introduced from Brazil 1843. It is placed by some authorities under *Lycaste.*

Other Exhibits.

Sir Jeremiah Colman, Bart., V.M.H. : rare Orchids.
E. de Q. Quincey, Esq. : *Cypripedium Wiertzianum.*
The Earl of Craven : *Laeliocattleya* × *Martinetii.*
Monsieur H. Graire : *Odontioda* hybrid.

ORCHID COMMITTEE, JULY 29, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for rare species.

To Messrs. Charlesworth, Haywards Heath, for well-grown specimens.

Bronze Banksian Medal.

To Messrs. Jas. Veitch, Chelsea, for a group of scarlet *Disa grandiflora* raised from seeds sown three years ago.

To Messrs. Hassall, Southgate, for hybrids.

To R. G. Thwaites, Esq., Streatham (gr. Mr. J. M. Black), for a group.

Award of Merit.

To *Miltonia* × *Charlesworthii* 'Mrs. Ralli' (*vexillaria* 'Memoria G. D. Owen' × *Hyeana*) (votes, 8 for, 3 against), from Pantia Ralli, Esq., Ashtead Park, Surrey. Flowers white, tinged with pink and with a maroon-coloured mask on the lip.

To *Odontoglossum* × 'Queen Alexandra' var. 'Theodora' (*Harryanum* × *triumphans*) (votes, 12 for, 3 against), from de B. Crawshay, Esq., Rosefield, Sevenoaks. The largest form of this showy hybrid, having flowers nearest to *O. Harryanum.* Sepals and petals yellow, blotched with chestnut-red. Lip white, with violet markings.

Cultural Commendation.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., for a basket of 20 plants of the orange-red *Habenaria rhodochila.*

To Messrs. Charlesworth for *Angraecum Eichlerianum* with 15 flowers.

Other Exhibits.

Sir Jeremiah Colman, Bart., V.M.H. : rare Orchids.
Pantia Ralli, Esq. : Odontiodas and *Odontoglossum eximium* var.

Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H.: *Maxillaria fractiflexa* and other fine species.

de B. Crawshay, Esq.: *Odontioda* × 'Desdemona' (*C. Noezliana* × *O.* × 'Othello').

Messrs. Manda, St. Albans: Cattleyas.

ORCHID COMMITTEE, AUGUST 12, 1913.

Mr. J. GURNEY FOWLER in the Chair, and fourteen members present.

Awards Recommended:—

Silver Flora Medal.

To E. H. Davidson, Esq., Orchid Dene, Twyford, for choice hybrids.

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for rare Orchids.

To Messrs. McBean, Cooksbridge, for a group.

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group.

Award of Merit.

To *Laeliocattleya* × *Wellesleyi* var. 'Flambeau' (*C. Warscewiczii* × *L.-c.* × *Martinetii*) (votes, unanimous), from E. H. Davidson, Esq., Twyford. A very handsome *Laeliocattleya*, with a strong indication of *Cattleya Warscewiczii* in the ample labellum. Sepals and petals bright purplish-rose, with a golden tint. Lip deep crimson, darker in the centre, and with fine gold lines from the base.

Cultural Commendation.

To Messrs. Charlesworth for a large specimen of *Cryptophoranthus Dayanus* with about 150 flowers.

Other Exhibits.

R. G. Thwaites, Esq.: Odontiodas.

Messrs. Armstrong & Brown: *Dendrobium Hookerianum.*

de B. Crawshay, Esq.: *Odontoglossum* × 'Queen Alexandra' and *Odontioda* × *Leeana.*

Mr. E. V. Low: *Laeliocattleya* × 'Ophir,' E. V. Low's variety.

Messrs. Sander: *Laeliocattleya* × 'Phoenix' var. 'King George.'

Messrs. Stuart Low: various showy Orchids.

ORCHID COMMITTEE, AUGUST 26, 1913.

Mr. J. GURNEY FOWLER in the Chair, and fourteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for Laeliocattleyas, &c.

To Messrs. Armstrong & Brown, Tunbridge Wells, for handsome hybrids.

To Messrs. Sander, St. Albans, for hybrids and rare species.

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for finely grown Orchids.

To Messrs. Hassall, Southgate, for a group.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a group.

First-class Certificate.

To *Odontonia* × *brugensis* 'Eileen' (*Odontoglossum Edwardii* × *Miltonia vexillaria* 'Memoria G. D. Owen') (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). A very remarkable hybrid, with the flowers flatly arranged as in *Miltonia*. Spike erect, bearing six flowers, of a clear lilac-purple colour, with a narrow silvery margin to the segments, and an oblong dark red blotch in front of the yellow crest. (Fig. 155.)

To *Brassolaeliocattleya* × 'The Baroness' (*B.-c.* × 'Mrs. J. Leemann' × *L.-c.* × 'Ophir') (votes, unanimous), from Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill). Flowers large and well expanded, clear light yellow, with a rose-coloured blotch in the front of the fringed lip.

Award of Merit.

To *Laeliocattleya* × 'Marquis de Wavrin,' Orchidhurst variety (*L.-c.* × *elegans* × *C.* × *Hardyana*) (votes, unanimous), from Messrs. Armstrong & Brown, Tunbridge Wells. Flowers of fine shape and substance. Sepals and petals purplish-rose. Lip claret-crimson, with gold markings at the base.

To *Laeliocattleya* × 'Olenus' var. 'Ettrick' (*L.-c.* × *bletchleyensis* × *C. Dowiana aurea*) (votes, 9 for, 2 against). An improvement on others of its class. Sepals and petals tinged and veined with light purple. Lip broad, claret-crimson.

To *Cattleya* × *Hardyana* 'Mrs. Waters Butler' (*Warscewiczii* × *Dowiana aurea*) (votes, 11 for, 1 against), from W. Waters Butler, Esq., Southfield, Edgbaston (gr. Mr. R. H. Jones). Lip bright chrome-yellow, with purple front. Sepals and petals tinged and veined with rose-purple. (Fig. 156.)

Cultural Commendation.

To Mr. Collier, gr. to Sir Jeremiah Colman, Bart., for a large specimen of *Ornithidium Sophronitis* with many flowers.

Other Exhibits.

Sir Jeremiah Colman, Bart.: rare species.

Pantia Ralli, Esq.: *Odontioda* × 'Euterpe.'

H. S. Goodson, Esq.: *Cattleya* × *Hardyana Goodsonae.*

NARCISSUS AND TULIP COMMITTEE.

MARCH 4, 1913.

Mr. E. A. BOWLES, M.A., F.E.S., F.L.S., in the Chair, and twenty-two members present.

Messrs. Mauger, Guernsey, exhibited flowers under the name of *Narcissus odorus Campanella rugulosus*, and asked whether the variety was identical with *N. odorus rugulosus maximus*. The Committee considered it to be a large form of *N. odorus Campanella*.

The subject of registration was discussed, and it was agreed "that no name of a Daffodil shall be registered unless the classification of the variety be given at the same time." It was further agreed that in future editions of the "Daffodil List" the names of unclassified Daffodils shall be placed together at the end of the classified varieties.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. Christopher Bourne, Bletchley, for a group of Daffodils.

Silver Flora Medal.

To Messrs. Barr, Covent Garden, for Daffodils.

To Messrs. Cartwright and Goodwin, Kidderminster, for Daffodils.

Silver Banksian Medal.

To Messrs. J. R. Pearson, Lowdham, Notts, for a group of Daffodils.

To Messrs. Walter T. Ware, Inglescombe, Bath, for newer Daffodils in pots.

Other Exhibits.

Messrs. R. H. Bath, Wisbech ; Daffodils and Tulips.

Messrs. Robert Sydenham, Birmingham ; Daffodils.

NARCISSUS AND TULIP COMMITTEE, MARCH 18, 1913.

Rev. G. H. ENGLEHEART, V.M.H., in the Chair, and eighteen members present.

The Publications Sub-Committee briefly outlined a proposed scheme for the "Daffodil Year Book," and this was approved, Messrs. P. R. Barr and G. W. Leak being added to the Sub-Committee.

A discussion took place concerning the advisability of granting awards to Daffodils suitable for various special purposes, as it was felt that the high standard of form now required excluded many excellent Daffodils from all possibility of awards. Eventually Messrs.

FIG. 155.—ODONTONIA × BRUGENSIS 'EILEEN.' (p. clxiii.)

[*To face p.* clxiv.

W. T. Ware, W. A. Watts, P. R. Barr, J. D. Pearson, and G. W. Leak were appointed to draw up a scheme of awards for the consideration of the Committee; the Rev. J. Jacob to be convener.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Cuthbert, Southgate, for Tulips in pots.
To Messrs. Barr, Covent Garden, for Daffodils.

Silver-gilt Banksian Medal.

To Messrs. Cartwright and Goodwin, Kidderminster, for Daffodils.

Silver Banksian Medal.

To Mr. Christopher Bourne, Bletchley, for Daffodils.

Bronze Flora Medal.

To Mr. F. Herbert Chapman, Rye, for new Daffodils.
To Messrs. Robert Sydenham, Birmingham, for Daffodils.
To Messrs. Bath, Wisbech, for Daffodils and Tulips.

Other Exhibits.

Rev. G. H. Engleheart, V.M.H., Dinton, Salisbury; new Daffodils.
Mr. Alex. Wilson, Shovel, Bridgwater; new Daffodils.
Miss V. Warren, Westbere, Canterbury; seedling Daffodils.
Mr. W. A. Watts, St. Asaph; seedling Daffodils.

NARCISSUS AND TULIP COMMITTEE, APRIL 1, 1913.

MR. J. T. BENNETT PÖE, V.M.H., in the Chair, and twenty-six members present.

A scheme for granting Awards to Daffodils for special purposes, such as garden decoration, &c., was submitted and discussed at considerable length. It was subsequently referred back to the Sub-Committee for further consideration in connexion with the various points raised.

The death of Mr. Andrew Kingsmill was reported, and the Committee desired that a letter of condolence be sent to Mrs. A. Kingsmill and family.

The Committee recommended to the Council that the meetings of the Narcissus and Tulip Committee commence at 11 A.M. in 1914.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Barr, Covent Garden, for Daffodils, including many new varieties.

To Mr. Alex. Wilson, Shovel, Bridgwater, for new Daffodils.

Silver-gilt Banksian Medal.

To Mr. Christopher Bourne, Bletchley, for Daffodils.

To Messrs. Cuthbert, Southgate, for a large group of Tulips.

Silver Flora Medal.

To Messrs. Cartwright and Goodwin, Kidderminster, for Daffodils.
To Mr. F. Herbert Chapman, Rye, for Daffodils.

Silver Banksian Medal.

To Messrs. Bath, Wisbech, for Daffodils and Tulips.
To Messrs. Robert Sydenham, Birmingham, for Daffodils.
To Mr. A. Watts, St. Asaph, for new Daffodils.

Bronze Flora Medal.

To Lissadell Bulb Farm, Sligo, for Irish-grown Daffodils.

Award of Merit.

To Narcissus 'White Emperor' (votes, unanimous), a fine white variety difficult to classify, as it appeared to be on the border line between the Trumpet and the *Incomparabilis* sections; from Messrs. Cartwright and Goodwin.

Other Exhibits.

Rev. G. H. Engleheart, Dinton, Salisbury; new Daffodils.
Wargrave Plant Farm, Ltd., Liverpool Street, E.C.; Tulips and Daffodils.
Miss V. Warren, Westbere, Canterbury; seedling Daffodils
Mrs. R. O. Backhouse, Hereford; seedling Daffodils.

NARCISSUS AND TULIP COMMITTEE, APRIL 15, 1913.

Mr. WALTER T. WARE in the Chair, and twenty-three members present.

It was reported that the Rev. Joseph Jacob had been appointed Editor of the material for the proposed "Daffodil Year Book."

Barr Memorial Cup.

To Mr. P. Rudolph Barr for the year 1913–14.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Barr, Covent Garden, for Daffodils and Tulips.
To Mr. Alex. Wilson, Shovel, Bridgwater, for new Daffodils.

Silver-gilt Banksian Medal.

To Mr. Christopher Bourne, Bletchley, for Daffodils and Tulips.
To Messrs. Cuthbert, Southgate, for Tulips.

Silver Flora Medal.

To Mr. F. Herbert Chapman, Rye, for Daffodils.

Silver Banksian Medal.

To Messrs. Bath, Wisbech, for Daffodils and Tulips.
To Mr. W. A. Watts, St. Asaph, for Daffodils.
To Messrs. Robert Sydenham, Birmingham, for Daffodils.
To Messrs. Cartwright and Goodwin, Kidderminster, for Daffodils.

Bronze Flora Medal.

To Lissadell Bulb Farm, Sligo, for Daffodils.

First-class Certificate.

To Narcissus 'Mrs. Ernst Krelage' (votes, 17 for, 0 against), from Messrs. E. H. Krelage, Haarlem, Holland. This fine white Trumpet variety gained an Award of Merit in 1912.

Award of Merit.

To Narcissus 'Europa' (votes, 10 for, 5 against), from Messrs. Walter T. Ware, Inglescombe, Bath.

To Narcissus 'St. Olaf' (votes, 18 for, 0 against), from Messrs. Barr, Covent Garden.

To Narcissus 'Cædmon' (votes, 15 for, 0 against), from Messrs. Barr, Covent Garden.

Other Exhibits.

Mr. H. Hemsley, Crawley; Daffodils.

Messrs. Jas. Veitch, Chelsea; Daffodils.

NARCISSUS AND TULIP COMMITTEE, APRIL 29, 1913.

Mr. WALTER T. WARE in the Chair, and fifteen members present.

Mr. P. R. Barr brought forward the Sub-Committee's scheme of awards to Daffodils suitable for garden decoration, &c.; this was approved, and it was agreed that it be sent as a recommendation to the Council.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Barr, Covent Garden, for Daffodils and Tulips.

To Messrs. Cuthbert, Southgate, for Darwin Tulips.

Silver Flora Medal.

To Messrs. Bath, Wisbech, for Daffodils and Tulips.

Silver Banksian Medal.

To Messrs. Sutton, Reading, for Daffodils.

To Messrs. Cartwright and Goodwin, Kidderminster, for Daffodils.

Award of Merit.

To Narcissus 'Evangeline' (votes, 12 for, 2 against), a beautiful Leedsii form, from Mr. H. N. Phillips, Olton.

To Narcissus 'Venetia' (votes unanimous), a lovely and graceful white variety obtained by crossing *Narcissus calathinus* with *N.* 'Minnie Hume'; from Mr. W. B. Cranfield, Enfield Chase.

Other Exhibits.

Messrs. Jas. Veitch, Chelsea; Daffodils and Tulips.

NARCISSUS AND TULIP COMMITTEE, MAY 14, 1913.

Mr. E. A. BOWLES, M.A., F.E.S., F.L.S., in the Chair, and twelve members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. James Carter, Raynes Park, Surrey, for a group of Darwin Tulips.

To Messrs. Hogg and Robertson, Mary Street, Dublin, for a group of Darwin Tulips.

To Messrs. Sutton, Reading, for Darwin Tulips.

Silver-gilt Banksian Medal.

To Messrs. Barr, Covent Garden, for late Tulips.

To Mr. W. A. Watts, St. Asaph, for late Tulips.

Silver Flora Medal.

To Messrs. Cuthbert, Southgate, for Tulips.

To Messrs. Wallace, Colchester, for a group of late Tulips.

Silver Banksian Medal.

To Mr. Christopher Bourne, Bletchley, for a group of Tulips.

To Messrs. Jas. Veitch, Chelsea, for a group of Tulips.

To Messrs. Dobbie, Edinburgh, for a group of Tulips.

Award of Merit.

To Darwin Tulip ' Massenet ' (votes, 8 for, 1 against), from Messrs. Bath, Wisbech.

Other Exhibits.

Messrs. Fells, Letchworth, Herts ; group of Tulips.

Wargrave Plant Farm, Liverpool Street, E.C. ; group of Tulips.

ESTABLISHED
1804.

INCORPORATED
1909.

TELEGRAMS:
"HORTENSIA,
SOWEST-LONDON."

TELEPHONE:
5363 VICTORIA.

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

1. General.
2. Letters.
3. Telephone and Telegrams.
4. Journals Wanted.
5. Subscriptions.
6. Form of Bequest.
7. Privileges of Chemical Analysis.
8. List of Fellows.
9. New Fellows.
10. An Appeal.
11. R.H.S. Gardeners' Diary.
12. Lindley Library.
13. The Society's Gardens at Wisley.
14. Rock Garden at Wisley.
15. The Wisley Research Station.
16. Students at Wisley.
17. Distribution of Surplus Plants.
18. Exhibitions, Meetings, and Lectures in 1914.
19. Forced Bulb Show.
20. Challenge Cup for Scented Rose.
21. Trials at Wisley.
22. Trial Seedling Dahlias.
23. Dahlia Prizes.
24. A National Diploma in Horticulture.
25. Examinations.
26. Information.
27. Inspection of Fellows' Gardens.
28. Affiliation of Local Societies.
29. Affiliated Societies Certificate Cards.
30. Rules for Judging—1914 Code.
31. Rules for Judging Cottage, &c., Gardens.
32. Daffodil Year Book.
33. Disbudding of Orchids.
34. Disbudding Chrysanthemums.
35. Advertisements.

1. GENERAL.

Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on *all* subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number: **5363 VICTORIA.**
"**HORTENSIA, SOWEST-LONDON,**" is sufficient address for telegrams. This address counts as two words only.

4. JOURNALS WANTED.

The Secretary would be greatly obliged by the return to the Society of ANY NUMBERS of the JOURNAL which may be of no further use to Fellows. Complete sets are occasionally applied for, but, at the present moment, not even one can be supplied owing to the stock of the following being exhausted :—

VOLUME IV. Part 14.
VOLUME V. Part 1.
VOLUME X.
VOLUME XIII. Part 1.
VOLUME XIV.
VOLUME XV. Parts 2 and 3.
VOLUME XXXVIII. Part 3.

These are, therefore, particularly asked for.

5. SUBSCRIPTIONS.

All annual subscriptions are payable in advance on the 1st day of January in each year. A Fellow, if elected before the 1st of July, shall pay the annual subscription for the current year ; if elected after the 1st of July and before the 1st of October, he shall pay half a year's subscription ; if elected after the 1st of October and before the 1st of January, he shall pay at the time of his election the full amount of his subscription for the year commencing from the 1st day of January then next, and no further subscription until the next succeeding 1st of January. To avoid the inconvenience of remembering their subscriptions Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments ; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. It may be a week or more before the Tickets reach the Fellows, owing to the very large number (over 20,000) to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society ; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas, and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society," and crossed "London County and Westminster Bank Victoria Branch, S.W."

6. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £....., to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease ; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

7. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 107 in the " Book of Arrangements," 1913.

8. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the address insufficient, they are requested to inform the Secretary at once. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL (Advt. pp. 32, 33) and the " Book of Arrangements."

9. NEW FELLOWS.

The President and Council fully appreciate how much the prosperity of the Society and its present large number of Fellows are due to the efforts of Fellows to enlist the sympathy of their friends ; and the steady advance during recent years indicates the increasing recognition of the Society's work and usefulness. But it must not be supposed that a maximum has yet been reached. There is ample room for a great increase of Fellows, especially in America and the Colonies.

10. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows ; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially by :—

1. Increasing the Number of Fellows.
2. Helping to swell the Fund for providing Prizes for the Students at Wisley.
3. Providing Lectures with Lantern Slides.
4. Presenting Books to fill the gaps in the Library both at Vincent Square and at Wisley.
5. Sending new or rare Plants and Seeds for the Garden and surplus Roots for distribution to the Fellows.
6. Sending Plants for the *New Rock Garden* at Wisley.

Thus there is plenty for all to do according to their individual liking : personal effort, money, plants, books, are all alike needed. The Secretary asks for help in the ways above indicated.

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

Since this notice last appeared, the President and Council have to acknowledge the gift of £5 from Miss Wilson for books for the Wisley Library, the promise of £5 from Mr. Jas. Hudson for prizes for the Wisley Students, a collection of dried specimens of flowers collected by the late Sir Hugh Low, from Miss Evelyn M. C. Kaye, and two framed coloured prints of fruits, dated 1732, sent anonymously.

11. R.H.S. GARDENERS' DIARY.

The R.H.S. Gardeners' Diary for 1914 will be issued in November. It will contain a considerable quantity of new information, and it has been compiled more especially for the single-handed gardener. The price is 1*s.* 1*d.*, post free, from the R.H.S. Office, Vincent Square, London, S.W.; or 2*s.* 1*d.* if leather-bound.

12. LINDLEY LIBRARY.

The Society, acting in and through its Council, having now become sole trustee of the Lindley Library, Fellows and friends of the R.H.S. have the encouragement of knowing that their gifts to the Library can never be lost to the Society, but are attached to it in perpetuity. It should now be the aim of all to make the Library far more perfect and complete than it is at present. Gifts of books, old or new, will be gratefully accepted.

13. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets, from 9 A.M. till sunset, except on Sundays, Good Friday, Christmas Day, and Exhibition Days. Each Fellow's Ticket admits three to the Gardens. The Public are not admitted.

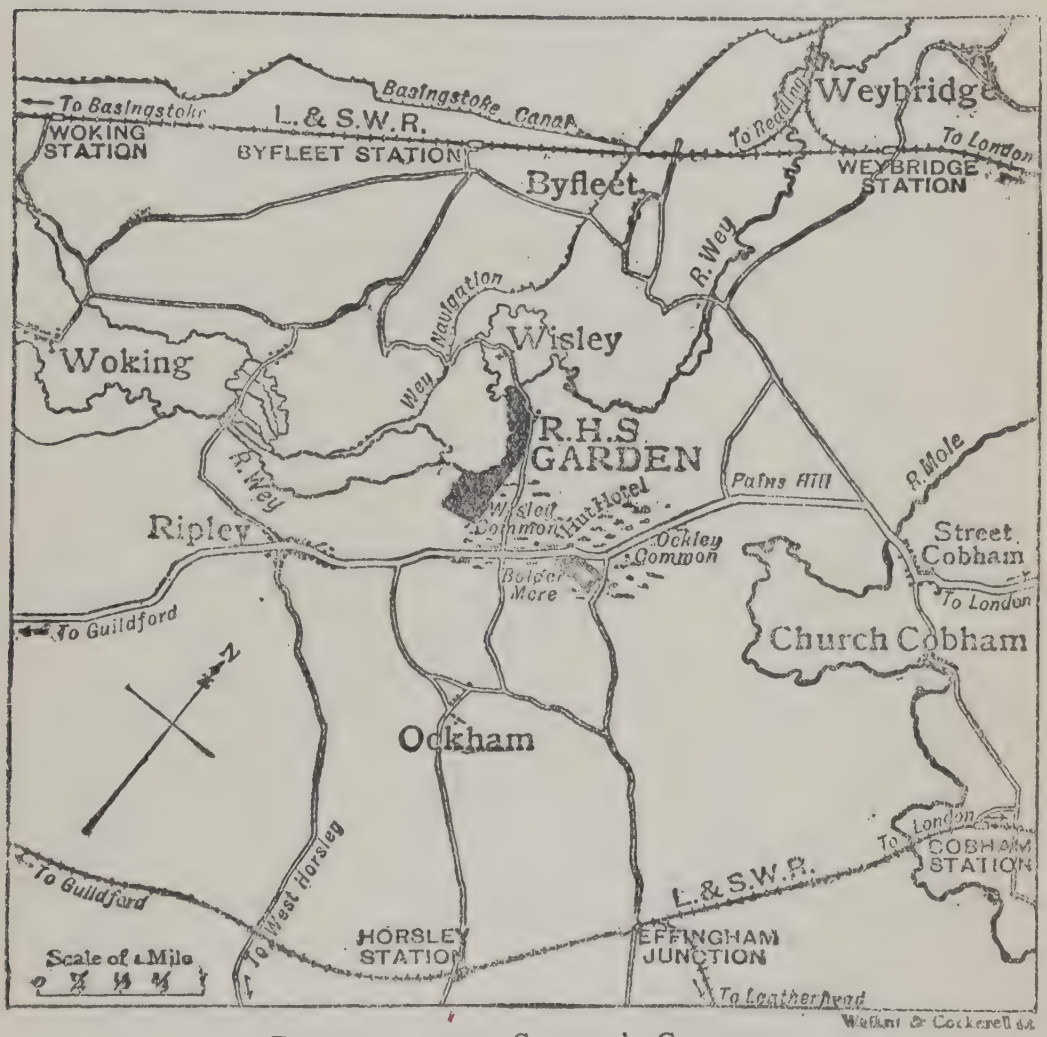
The Gardens, situated at Wisley (about 2 miles from Ripley, in Surrey), are about 3 miles from Byfleet, 3½ miles from Horsley, and 5½ miles from Weybridge, all stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey; the charge being, to and from Weybridge, waiting two hours at the Gardens, 8*s.*; or waiting three hours, 10*s.*; or to and from Horsley, 7*s.*; Effingham Junction, 7*s.*; Byfleet, 7*s.* Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Carriages can also be obtained at Weybridge for 8*s.* by writing to Mr. Trembling, New Road, Weybridge. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

The motor route from London to Wisley will be found in the "Book of Arrangements," p. 146.

14. ROCK GARDEN AT WISLEY.

In consequence of the rapidly increasing interest taken in what are popularly called "Alpine Plants," "Alpines," or "Rock Plants," the Council have constructed a Rock Garden at Wisley on a somewhat

extensive scale. The idea is to obtain the best possible positions and soils for the different plants to grow in, the growth and well-being of the plants being considered to be of even greater importance than the artistic effect of the rockwork. In a Horticultural Society's Garden every single detail should teach something, so that Fellows visiting it may be able to take away an idea of how best to do this or that, or where best to plant this or that. The construction of the Rock Garden is completed, and the planting is proceeding, but it will be at least two years or more before the plants on it can be seen at their best



POSITION OF THE SOCIETY'S GARDENS.

An Alpine House has been built above the Rock Garden, chiefly for the purpose of growing rock plants to perfection which blossom too early to withstand our wet winters and late spring frosts. In this House Fellows may see such plants in flower from February onwards.

15. THE WISLEY RESEARCH STATION.

Investigations are now in full swing at the new Research Station and Laboratory at Wisley. All communications relating to them should be addressed to Mr. F. J. Chittenden, F.L.S., Director of the Research Work on Scientific Matters affecting Practical Horticulture and Lecturer to the Students.

16. STUDENTS AT WISLEY.

N.B.—There will be a few vacancies for the two years' Course commencing in September 1913. Early application should be made to the Secretary.

The Society admits young men, between the ages of sixteen and twenty-two years, to study Gardening at Wisley. The curriculum includes not only practical garden work in all the main branches of Horticulture, but also Lectures, Demonstrations, and Horticultural Science in the Laboratory, whereby a practical knowledge of Garden Chemistry, Biology, &c., may be obtained.

17. DISTRIBUTION OF SURPLUS PLANTS.

In a past Report the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock, which must either be given away or go to the waste-heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded ; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants ? It was, therefore, decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by Ballot.

Fellows are, therefore, particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution is permitted. The great majority also are, of necessity, *very small,* and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the " Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot ; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is, therefore, obvious that when the Ballot is kind to any Fellow he will receive the majority of the plants he has selected, but when the Ballot has given him an unfavourable place he may find the stock of almost all the plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in

a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Gardens cannot be disorganized by the sending out of plants at any later time in the year. All Fellows can participate in the annual distribution *following* their election.

The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form. It is impracticable to send plants by post, owing to the lack of Post Office facilities for despatch without prepayment of postage.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries ; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

No plants will be sent to Fellows whose subscriptions are in arrear, or who do not fill up their forms properly.

18. EXHIBITIONS, MEETINGS, AND LECTURES IN 1914.

The programme will be found in the " Book of Arrangements " for 1914. An Exhibition and Meeting is held practically every fortnight throughout the year, and a short lecture on some subject connected with Horticulture is delivered during the afternoon.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (32) of halfpenny cards *ready addressed* to himself.

January	13, 27.
February	10 (Annual Meeting), 24.
March	10–11 (Forced Bulbs), 24.
April	7, 15–16 (Daffodils), 21, 23 (Spring Roses).
May	5, 19–21 (Chelsea), 25–29 (Rhododendrons).
June	3, 16, 30 (Holland House).
July	1–2 (Holland House), 14, 16 (Sweet Peas), 17 (Carnations), 28.
August	11, 25.
September	8 (Dahlias), 22 (Vegetables), 24 (Autumn Roses), 29–30 (Fruit Show).
October	6, 20.
November	3, 17.
December	1.

19. SPRING SHOW OF FORCED BULBS.

TUESDAY AND WEDNESDAY, MARCH 10 AND 11, 1914.

A Special Exhibition of Forced Spring Bulbs will be held on these days, the object being to demonstrate the varieties best suited for gentle forcing. Exhibits of small and large collections are invited from Amateurs and the Trade. R.H.S. Medals will be awarded according to merit.

HYACINTHS, TULIPS, AND DAFFODILS.

The Council also offer (subject to the General Rules of the Society) the following Prizes presented to them by the General Bulb Growers' Society of Haarlem :—

DIVISION I.—*For Amateurs.**

Class 3.—Eighteen Hyacinths, distinct.

1st Prize . .	£6 6s.	4th Prize . .	£3 3s.
2nd ,, . .	£5 5s.	5th ,, . .	£2 2s.
3rd ,, . .	£4 4s.	6th ,, . .	£1 1s.

Class 4.—Twelve Hyacinths, distinct.

1st Prize . .	£5 5s.	4th Prize . .	£2 2s.
2nd ,, . .	£4 4s.	5th ,, . .	£1 1s.
3rd ,, . .	£3 3s.		

Class 5.—Six Hyacinths, distinct.

1st ,, . .	£2 2s.	3rd Prize . .	£1 1s.
2nd ,, . .	£1 10s.	4th ,, . .	10s.

Class 6.—Four pans containing Hyacinths, ten roots of one variety in each pan. The blooms of each pan to be of distinctly different colour from those of the other three pans ; the bulbs need not have been actually grown in the pans they are shown in.

1st Prize . .	£4 4s.	3rd Prize . .	£2 2s.
2nd ,, . .	£3 3s.	4th ,, . .	£1 1s.

Class 7.—The finest decorative display of Hyacinths grown from first size bulbs.

Only Prize—The Gold Medal of the General Bulb Growers' Society of Haarlem.

DIVISION II.—*For Trade Growers.*

Class 8.—The finest decorative display of Hyacinths grown from first size bulbs.

Only Prize—The Gold Medal of the General Bulb Growers' Society of Haarlem.

Regulations.—For classes 3, 4, and 5, each bulb must be in a separate

* The Society only recognizes three divisions of growers :—
1. Amateurs growing for their own use or pleasure and employing assistance or otherwise.
2. Trade, growing for sale retail.
3. Market gardeners, growing wholesale for market.

pot (size optional). Classes 3, 4, 5, and 6 must be all single spikes; no spikes may be tied together. Exhibitors may only compete in *one* of the classes 3, 4, and 5. All bulbs must have been forced entirely in Great Britain or Ireland. All varieties should be correctly named. Points will be deducted for all incorrect names.

Bulbs grown in Moss Fibre &c.

Subject to the General Rules of the Society, the Council also offer the following Prizes presented to them by Messrs. Robert Sydenham, Ltd. :—

Classes 8–10.—Bulbs grown in moss fibre or similar material (not earth) and without drainage.

Amateurs.

Class 8.—Six single Hyacinths, in separate vases, not exceeding six inches in diameter, to be selected from any one of the following varieties : 'Boerhaave,' 'City of Haarlem,' 'Enchantress,' 'General Vetter,' 'Innocence,' 'Ivanhoe,' 'Jacques,' 'King of the Blues,' 'Koh-i-Noor,' 'Lady Derby,' 'La Grandesse,' 'Queen Mary,' 'Schotel,' 'Totula,' and 'Victory.'

Prizes, 21*s.*, 17*s.* 6*d.*, 15*s.*, 10*s.* 6*d.*, 7*s.* 6*d.*

Class 9.—Six vases of Tulips (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following : 'Couleur Cardinal,' 'Fabiola,' 'Golden Queen,' 'Joost van Vondel,' 'Keizerskroon,' 'Le Rêve,' 'Pink Beauty,' 'Prince of Austria,' 'Red Admiral,' 'Rose Luisante,' 'Van der Neer,' 'Vermilion Brilliant,' and 'White Joost van Vondel.'

Prizes, 21*s.*, 17*s.* 6*d.*, 15*s.*, 10*s.* 6*d.*, 7*s.* 6*d.*

Class 10.—Six vases of Narcissi (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following : 'Albatross,' 'Argent,' 'Artemis,' 'Cardinal,' 'Cresset,' 'Dairymaid,' 'Diadem,' 'Duchess of Westminster,' 'Firebrand,' 'Glitter,' 'Gloria Mundi,' 'Golden Bell,' 'Golden Nugget,' 'Horace,' 'Lilian,' 'Lucifer,' 'Madame de Graaff,' 'Mrs. C. Bowley,' 'Scarlet Runner,' 'Seagull,' 'Siddington,' 'Stonechat,' 'Victoria,' and 'White Lady.'

Prizes, 21*s.*, 17*s.* 6*d.*, 15*s.*, 10*s.* 6*d.*, 7*s.* 6*d.*

If there are more than six exhibits in either of the Classes 8–10 an extra prize of 7*s.* 6*d.* will be given in such class if there are eight exhibits ; a further 7*s.* 6*d.* if there are ten exhibits, and so on, in the proportion of one prize for every two exhibits exceeding six in each class. The exhibits in these classes must have been grown entirely in the receptacles in which they are shown.

20. THE "CLAY" CHALLENGE CUP FOR A NEW ROSE,

NOT IN COMMERCE, POSSESSING THE TRUE OLD ROSE SCENT.

Messrs. Clay have presented to the Council a Silver-gilt Cup of the value of £75 for annual competition (open to all) at the Holland House Show, its object being to endeavour to obtain a new race of Roses of both good form and colour, but above all else possessing the true old genuine Rose scent, such as may be found in the old Cabbage or Provence Rose, in 'General Jacqueminot,' 'Marie Baumann,' 'Duke of Wellington,' 'General McArthur,' &c. The distinctive scent known as "Tea Rose" is not, for the purpose of this competition, to be accounted as the true Rose Scent.

Not more than three different varieties may be shown by any one competitor, but at least three and not more than six cut blooms of each variety.

For five consecutive years Messrs. Clay will also present a smaller commemorative Cup, which the Council will give to the winner of the Challenge Cup when at the end of the twelve months it shall have been returned safely and in good condition.

The winner of one year may not win again the next year, but only in alternate years.

In any year the award of the Cup may be withheld if the Council are of opinion that there is no exhibit worthy of it.

The decision of the Council is final.

The Council will not award this high distinction unless satisfied and assured that the exhibit is, in the main, due to the work and capability of the exhibitor or his employés; on this point the Council may consult any expert not eligible to win the Cup.

The Council may reserve decision till the third day of the Show.

The attention of intending exhibitors is particularly directed to the Society's 1914 Code of "Rules for Judging."

21. TRIALS AT WISLEY, 1914-15.

N.B.—Everything sent for trial *must be named*, and the name and address of the sender attached, together with the name of the raiser and introducer as far as known.

FRUIT.

Melons.—Ten seeds of each variety to be sent in February.

FLOWERS.

Tulips—of all descriptions.—Five bulbs of each (named) to be sent at once. (See below.)

Herbaceous Phlox.—Three plants of each to be sent in February.

Early-flowering outdoor Chrysanthemums.—Three plants of each to be sent in March.

Pentstemons.—Three plants of each to be sent in March.

Perennial Sunflowers (including Heleniums and Rudbeckias).—Three plants of each to be sent in February.

Asters—French, German, or China. Seed to be sent in February.

VEGETABLES.

Broccoli.—One packet of seed of each to be sent in February.

French Beans, outdoor.—One pint of seed of each to be sent in March.

TRIAL OF TULIPS.

In view of the confusion existing in the nomenclature of Tulips, the Council of the R.H.S. have been requested to draw up a list of synonyms, and have consented to do so with the co-operation of the Dutch growers. It is accordingly proposed to plant this autumn at Wisley (where Tulips do so well) as representative a collection of *all classes and descriptions* of Tulips as can be got together. Growers in Holland are asked to send over their bulbs to be grown side by side with those from English growers. Five bulbs of each variety should be sent at once. When they are in bloom a Joint Committee of Dutch and English Tulip specialists will be invited to meet at Wisley to determine the correct nomenclature. A synonymic list will then be prepared and issued in the JOURNAL of the Society. It is important that all bulbs sent should bear the name under which they are known to or sent out by the sender, and also an indication of their type—as Early, Late, Darwin, Parrot, Bizarre, Bybloemen, Rose, &c.

If sent by post: The Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey.

If sent by rail: The Superintendent, R.H.S. Gardens, Wisley, Horsley Station, L. & S.W.R., with advice by post to the Superintendent.

TRIAL OF HORTICULTURAL SUNDRIES.

Important Notice.

The Council will continue their Trial of Sundries in 1914 under the scheme which was brought into action this year. The system adopted has proved admirable after twelve months' practical test, and Sundriesmen are again invited to send their specialities (not more than three articles in any one year). Full particulars, with Entry Form, can be obtained from the Secretary, R.H.S., Vincent Square, S.W., upon receipt of a stamped addressed envelope.

22. SEEDLING DAHLIAS.

The trial of Dahlias, from a garden decorative point of view, carried out this year in the gardens of Reginald Cory, Esq., at Duffryn, has proved a genuine success, and in consideration of this, and desiring to encourage raisers still further to devote particular attention to producing varieties well adapted to garden decoration, Mr. Cory felt the desirability of holding a further trial next year, and, after putting his views before the Council of the Society and the National Dahlia

Society, and being assured of their willingness to co-operate with him as they did this year, he has decided to hold a trial in 1914 of seedlings not in commerce, and any varieties offered for the first time in 1914.

These will be grown and judged and reported on in exactly the same way, and as far as possible by the same individuals, as in 1913. Three plants of each variety should be sent, carriage paid, to Reginald Cory, Esq., Duffryn, Cardiff, if sent by post; or labelled per G.W.R. to Ely station, near Cardiff, if sent by rail. For various considerations it has been decided that only rooted cuttings must be sent, and those who intend participating in the trials are particularly requested to send them as early as possible in the new year, in order that they may be grown on to the best advantage before planting out. Mr. Cory kindly offers the Council a £5 5*s*. Cup to be awarded to the most meritorious plant, and the Council will give any other awards they think fit.

23. DAHLIA PRIZES AT THE R.H.S. MEETING ON SEPTEMBER 8, 1914.

The object of this competition is not so much to attract the finest cut blooms as seen on the Show stand, for such flowers may, when growing on the plant, be almost invisible, and no contribution to the decoration of the Garden, whatever they may be for cutting. The object is to discover the most Decorative Garden Dahlias—that is, those varieties which add most to the beauty of the Garden, and, as is well known, not a few of the most glorious Dahlia flowers add nothing to the aspect of the Garden as they are hidden beneath the foliage. They may be excellent to grow in the Kitchen Garden to cut for house decoration, but they are useless for the ornamentation of the Pleasure Garden. (See paragraph 22.) So-called Show Dahlias *may* also be Decorative and therefore eligible.

SCHEDULE.

Class A. Amateurs. A group of Decorative Garden Dahlias of all or any sections. Twelve feet run of 3 feet tabling, not to be built up more than 8 feet in height from the ground level.

First Prize: R.H.S. Silver Cup, to which will be added the Veitch Memorial Medal.

The Council may make other awards according to merit.

Class B. Open. A group of Decorative Garden Dahlias of all or any sections. Twenty-five feet run of 3 feet tabling, not to be built up more than 8 feet in height from the ground level.

First Prize: Seventy-five Guinea Challenge Cup, presented to the R.H.S. by Reginald Cory, Esq.

The Council will make other awards according to merit.

In both Classes all the stems must touch the water, and no wiring or artificial support will be allowed. Hardy foliage or grasses may be employed for decoration.

The winner will hold the Cory Cup for one year, subject to a suffi-

cient insurance against loss, and to a guarantee to return it in good condition, or, failing this, to refund to the R.H.S. the sum of eighty guineas. On the return of the Cup the Council will present the holder with a smaller commemorative Silver Cup.

The same exhibitor may win the Cup only once in three years, but should the winner of the previous year be again considered first the Council will bestow a special award.

The decision of the Council is final, and the Cup may be altogether withheld at their discretion.

The Council will not award this high distinction unless satisfied and assured that the exhibit is, in the main, due to the work and capability of the exhibitor or his employés, and on this point the Council may consult any expert not competing for the Cup.

The attention of intending exhibitors is particularly directed to the Society's 1911 Code of "Rules for Judging."

24. A NATIONAL DIPLOMA IN HORTICULTURE.

Most gardeners will welcome the initiation by the Society of a scheme whereby a National Diploma in Horticulture may be gained by those who pass the Preliminary and Final Examinations which will be required. The Diploma will be thoroughly "National," for by the consent of H.M. Government the Department of Agriculture, after being approached in the matter, has consented to co-operate with the Society if the Society will undertake the work of organizing the Examinations, and has authorized that the Diploma shall bear the following words: "Awarded by the Royal Horticultural Society under a scheme approved by the Board of Agriculture."

The Examinations will be written, viva voce, and practical. The practical part will be held in suitable gardens at convenient centres in the country. The first Diploma Examination will be held in June 1914, and thereafter annually.

Among those for whose benefit the Diploma is established are the following:—Florists, Fruit Growers, Gardeners, Horticultural Inspectors, Horticultural Instructors, Landscape Gardeners, Market Gardeners, Nurserymen, Public Park Gardeners, and Seedsmen.

Fuller information may be obtained from the Secretary, Royal Horticultural Society, Vincent Square, S.W.

25. EXAMINATIONS, 1914.

1. The Annual Examination in the Principles and Practice of Horticulture will be held on April 1, 1914. The Examination has two divisions, viz. (*a*) for Candidates of eighteen years of age and over, and (*b*) for Juniors *under* eighteen years. Particulars for 1914 may be obtained by sending a stamped and directed envelope to the Society's offices. Copies of the Questions set from 1893 to 1913 (price 2s. post free) may also be obtained from the office. The Society

is willing to hold an Examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

The Examination will not be held outside the British Isles until further notice.

In connexion with this Examination a Scholarship of £25 a year for two years is offered by the Worshipful Company of Gardeners, to be awarded after the 1914 Examination to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of 18 and 22 years, and that he should study gardening for one year at least at the Society's Gardens at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is approved by the Council of the Society. In case of two or more eligible students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

2. The Society will also hold an Examination in Cottage Gardening on April 22, 1914. This Examination is intended for, and is confined to Elementary and Technical School Teachers. It is undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence of any test of such competence. The general conduct of this Examination is on similar lines to that of the more general Examination. Questions on Elementary Chemistry and Biology are included in this Examination.

Medals and Certificates are awarded and Class Lists published in connexion with these Examinations. The Syllabus may be obtained on application to the Secretary, R.H.S., Vincent Square, Westminster, S.W.

26. INFORMATION.

Fellows may obtain information and advice from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions, by applying to the Secretary, R.H.S., Vincent Square, Westminster, S.W. Where at all practicable it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

27. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost—viz. a fee of £3 3*s*. for one day (or £5 5*s*. for two consecutive days), together with all out-of-pocket expenses. No

inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Gardens. Gardens can only be inspected at the *written* request of the *owner*.

28. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of local Horticultural Societes by a scheme of affiliation to the R.H.S. Since this was initiated no fewer than 330 Societies have joined our ranks, and the number is steadily increasing.

Secretaries of Affiliated Societies can obtain on application a specimen of a Card which the Council have prepared for the use of Affiliated Societies for Certificates, Commendations, &c. Price 3*s.* 6*d.* for 10 copies, 5*s.* 6*d.* for 20, 11*s.* 6*d.* for 50, 20*s.* for 100. (See next par.)

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz. Bronze, 5*s.* 6*d.*, with case complete ; Silver, 12*s.* 6*d.*, with case complete ; Silver-gilt, 16*s.* 6*d.*, with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered, price 6*d.* each.

29. AFFILIATED SOCIETIES' CERTIFICATE CARDS.

At the request of several of the Affiliated Societies, the Council have had the Certificate Card (issued some years ago for the use of Affiliated Societies) beautifully coloured. The uncoloured Card will still continue to be issued at the old prices, and the new coloured Card at 8*d.* a single copy, or 10 for 5*s.*, post free.

30. RULES FOR JUDGING—1914 CODE.

The " Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have been revised, and the new edition is now ready. It contains several important amendments, and special attention is drawn to new " Rules for Judging Cottage and Allotment Gardens " with the companion " Judges' Point Sheet," and a " Classification of Stove, Greenhouse, and Hardy Plants for Show Purposes." The Secretaries of Local Societies are advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1*s.* 6*d.*, addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

31. RULES FOR JUDGING COTTAGE AND ALLOTMENT GARDENS.

To assist Allotment holders and Cottage Gardeners in their competitions, a set of Rules, with hints to both Exhibitors and Judges, has been drawn up. These Rules may be had at twopence a copy, or fifty for *7s.* 6*d.*

A companion Judges' Sheet in a very convenient book-like form can also be had for *2s.* a dozen. This Judges' Sheet has, in tabulated form, a list of the subjects usually grown in allotment gardens, flower gardens, and for window and wall decoration. The allotments or gardens to be judged are all numbered, and columns are provided in the judging sheet for the points given.

32. R.H.S. DAFFODIL YEAR BOOK.

The Council have consented to publish on August 1st a "Daffodil Year Book." It will contain the most up-to-date information regarding new varieties of Daffodils; the Awards made at the 1914 Daffodil Shows in London, Birmingham, and elsewhere; special articles, illustrative plates, and the Schedule for the 1915 R.H.S. Daffodil Show. The Year Book for 1913 is already sold out, so that all who are interested in these beautiful Spring flowers are advised to order a copy of 1914 at once from the Society's Office, Vincent Square, London, S.W. Price *2s.* 6*d.* post free.

33. DISBUDDING OF ORCHIDS.

At the request of the Orchid Committee the Council have made a rule that "Awards will not be given to any Orchids of which the natural size and character of the flowers have, in the opinion of the Orchid Committee, been in any way changed or improved through the removal of a bud or buds, or part of the spike."

34. DISBUDDING CHRYSANTHEMUMS.

When single-flowered Chrysanthemum plants are submitted for certificate one plant must be shown without any disbudding whatsoever, and one plant somewhat disbudded, in order that the quality of the blooms on the undisbudded stems may be compared with those on the disbudded stems.

35. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

SEPTEMBER 9, 1913.

Mr. JAMES HUDSON, V.M.H., in the Chair.

Fellows elected (12).—Mrs. M. Abrahams, The Hon. Richard Boyle, Miss Margaret Bushill, Walter Dade, Mrs. C. Fisher, Miss Agnes E. B. Higgins, Richard H. Hunter, Mrs. M. C. Krieger, Mrs. R. W. B. Mirehouse, Mrs. B. C. Norton-Knight, Mrs. Herbert C. Patton, Evan Thomas.

A lecture on " Stem Vegetables ; their dietetic values, and various ways of cooking them " was given by Mr. C. Herman Senn (see p. 523).

GENERAL MEETING.

SEPTEMBER 23, 1913.

Mr. ARTHUR W. HILL, M.A., F.L.S., in the Chair.

Fellows elected (60).—Viscountess Allendale, Mrs. G. H. Baines, F. J. Barron, Miss E. K. de la Poer Beresford, Miss E. Best, R. Bicknell, E. T. Browne, F. B. Bryant, C.S.I., T. Carlisle, Mrs. H. Cohen, Capt. J. H. Davidson-Houston, Mrs. W. L. Davies, Miss M. Eastman, Miss Eyton, T. Forster, A. Fullerton, J. Fullerton, L. Gibbs, G. C. Gough, B.Sc., A.R.C.Sc., Miss Græme, E. Rex Green, J. Haly, Mrs. Harrison, Mrs. C. Heinekey, P. L. Hesketh, H. Hewitt, Mrs. F. Hinzer, E. Hopkinson, C. Hopton, J. T. Howell, Herbert Jones, Mrs. Kirby, Lord Lamington, C. B. Lindsay, Miss A. Malden, Susan Countess of Malmesbury, Mrs. A. W. Marden, F. J. May, A. R. Motion, A. Moul, K. B. Murray, R. F. Nowell, The Earl of Onslow, G. Parker, W. Pearn, Mrs. J. Ripley, S. Saw, W. Smith, D. E. B. Soulby, Miss E. M. Stephenson, G. C. Swindells, C. E. J. Walkey, W. P. Ward, Lady Atkinson Willes, Mrs. J. H. Williams, Mrs. P. Garnons Williams, Dow. Viscountess Wolseley, T. Woolley, F. H. Wright, Miss Julia Yardley.

Fellows resident abroad (5).—G. Bradshaw (Hobart), Narayan C. Dutt (Calcutta), Laszlo Havas (Budapest), Hermann A. Hesse (Ems), Bremer W. Pond (Cambridge, U.S.A.).

Society affiliated (1).—Pershore and district Fruit Growers' and Market Gardeners' Association.

A lecture on "Autumn Border Plants" was given by Mr. C. Bernard Crisp (see p. 530).

FOURTH ANNUAL EXHIBITION OF VEGETABLES.

HELD IN THE SOCIETY'S HALL, VINCENT SQUARE, S.W., SEPTEMBER 23, 1913.

THE JUDGES.

Bates, W., The Gardens, Cross Deep, Twickenham.
Cheal, A., Lowfield Heath, Crawley, Sussex.
Hudson, J., V.M.H., Gunnersbury House Gardens, Acton, W.
Pearson, A. H., J.P., V.M.H., The Hut, Lowdham, Notts.
Pope, W., The Gardens, Welford Park, Newbury.
Poupart, W., Marsh Farm, Twickenham.
Senn, C. H., 329 Vauxhall Bridge Road, S.W.
Thomas, O., V.M.H., 25 Waldeck Road, Ealing.
Woolff, A., St. Ermin's Hotel, Westminster, S.W.

OFFICIAL PRIZE LIST.

THIS EXHIBITION WAS OPEN TO AMATEURS ONLY.

The Owner's name and address and the Gardener's name are entered on the first occurrence, but afterwards only the Owner's name is recorded.

Collections.

N.B.—A competitor could only enter in one of the first three Classes. Arrangement was taken into consideration by the Judges.

Class 1.—Twelve kinds distinct to be selected from the subjoined list: Beet, Brussels Sprouts, Cabbage, Broccoli or Cauliflower, Carrot, Celery, Cucumber, Endive, Leek, Lettuce, Mushroom, Onion, Parsnip, Pea, Potato, Tomato, Turnip, Bean (Runner or French), Vegetable Marrow.

First Prize, The Sutton Challenge Cup (value £21) and £10; Second, £5; Third, £3; Fourth, £2.

1. Hon. Vicary Gibbs, Aldenham House, Elstree (gr. Mr. E. Beckett).
2. T. Jones, Esq., Bryn Penylan, Ruabon.
3. F. J. Barrett, Esq., Overton, Ellesmere.
4. Mr. H. Keep, Aldermaston, Reading.

Class 2.—Nine kinds distinct, to be selected from the list in Class 1.

The object of this Class was to illustrate vegetables which are in daily use and possess the qualities most valued for table use by cooks.

First Prize, £5; Second, £3; Third, £2; Fourth, £1.

No award.

Class 3.—Six kinds distinct, to be selected from the list in Class 1.

First Prize, £3 ; Second, £2 5*s.* ; Third, £1 10*s.* ; Fourth, 15*s.*

1. B. Henderson, Esq., Epping House, Little Berkhamsted (gr. Mr. H. Smith).
2. F. Bibby, Esq., Hardwicke Grange, Shrewsbury (gr. Mr. J. Taylor).
3. Rt. Hon. T. F. Halsey, Gaddesden Place, Hemel Hempstead (gr. Mr. T. Avery).
4. Mrs. T. Goff, Sherfield Hall, Basingstoke (gr. Mr. H. E. Wallis).

Class 4.—Potatos, collection of twelve varieties distinct.

First Prize, £3 ; Second, £2 ; Third, £1.

1. Rev. T. McMurdie, Woburn Park, Weybridge (gr. Mr. A. Basile).
2. Mrs. E. H. Denison, Little Gaddesden, Berkhamsted (gr. Mr. A. G. Gentle).

No third.

Class 5.—Potatos, collection of six varieties distinct.

First Prize, £1 10*s.* ; Second, £1 ; Third, 10*s.*

Competitors in Class 4 cannot enter in 5.

1. G. Thorn, Esq., Sprotlands, Ashford, Kent.
2. H. W. Henderson, Esq., Serge Hill, King's Langley (gr. Mr. F. L Pike).
3. F. Bibby, Esq.

Class 6.—Onions, collection of six varieties distinct.

First Prize, £2 ; Second, £1 ; Third, 10*s.*

N.B.—Each dish was of a distinct type or character; *e.g.*, two strains of 'Ailsa Craig' or two dishes of varieties indistinguishable from 'Ailsa Craig,' disqualified.

1. Mrs. Jenner, Wenvoe Castle, Cardiff (gr. Mr. H. Wheeler).
2. Hon. Vicary Gibbs.
3. W. H. Myers, Esq., Swanmore Park, Bishops Waltham (gr. Mr. G. Ellwood).

Class 7.—Salads, collection of nine kinds distinct, each kind to be staged separately.

First Prize, £3 10*s.* ; Second, £2 10*s.* ; Third, £1 5*s.*

1. Hon. Vicary Gibbs.
2. T. Jones, Esq.

No third.

Class 8.—Salads, collection of six kinds distinct, each kind to be staged separately.

First Prize, £2 5*s.* ; Second, £1 10*s.* ; Third, 15*s.*

Competitors in Class 7 cannot enter in Class 8.

1. W. H. Myers, Esq.
2. B. Henderson, Esq.
3. Lord North, Wroxton Abbey, Banbury (gr. Mr. E. R. Janes).

Class 9.—Other vegetables, six kinds distinct, to be selected from the following:—Cardoon, Capsicum or Chili, Celeriac, *Stachys tuberifera*, Seakale, Egg Plant, Jerusalem Artichoke, Salsify, Scorzonera, Kohl Rabi, Couve Tronchuda.

First Prize, £2 10s.; Second, £1 10s.; Third, 15s.

1. Hon. Vicary Gibbs.
2. Lord North.

No third.

Single Dish Classes.

In Classes 10–42 the First Prize was in each case 10s.; the Second, 7s. 6d.; Third, 5s. The specimens shown in each Class were always of one and the same variety.

Class 10.—Beans, Scarlet Runners.

1. Mr. H. Keep.
2. B. Henderson, Esq.
3. W. H. Myers, Esq.

Class 11.—Beans, French Climbers.

1. Mr. J. J. Staward, St. Fort Gardens, Fife.
2. W. H. Myers, Esq.
3. Hon. Vicary Gibbs.

Class 12.—Beans, French Dwarf.

1. B. Henderson, Esq.
2. T. Jones, Esq.
3. Mrs. M. Knox, Holt Hatch, Alton, Hants (gr. Mr. W. West).

Class 13.—Beet, any one type.

1. H. W. Henderson, Esq.
2. Lord North.
3. Hon. Vicary Gibbs.

Class 14.—Brussels Sprouts, 50 buttons.

1. W. H. Myers, Esq.
2. F. J. Barrett, Esq.
3. H. W. Henderson, Esq.

Class 15.—Brussels Sprouts, 3 plants.

1. Hon. Vicary Gibbs.
2. F. J. Barrett, Esq.

No third.

Class 16.—Cabbage.

1. Hon. Vicary Gibbs.
2. Rt. Hon. T. F. Halsey.
3. Lord Foley, Ruxley Lodge, Claygate, Surrey (gr. Mr. H. C. Gardner).

Class 17.—Cabbage—Savoy.

1. S. Gissing Skelton, Esq., Sudbury Croft, Harrow (gr. Mr. A. Wilkinson).
2. W. H. Myers, Esq.
3. H. W. Henderson, Esq.

Class 18.—Cauliflower or Broccoli.

1. Hon. Vicary Gibbs.
2. F. Bibby, Esq.
3. Mr. P. B. Awcock, Iden Manor Gardens, Staplehurst, Kent.

Class 19.—Celeriac.

1. Rev. T. McMurdie.
2. Lord North.

No third.

Class 20.—Celery, White.

1. Hon. Vicary Gibbs.
2. Mrs. L. Davis, Brynderwin, Hindhead, Surrey (gr. Mr. W. H. Masters).
3. F. J. Barrett, Esq.

Class 21.—Celery, Red.

1. Hon. Vicary Gibbs.

Equal 2nd. { S. Gissing Skelton, Esq.
Mr. H. Keep.

3. W. H. Myers, Esq.

Class 22.—Cucumbers.

1. Rt. Hon. T. F. Halsey.
2. W. H. Myers, Esq.
3. Mr. J. J. Staward.

Class 23.—Leeks.

1. W. H. Myers, Esq.
2. Hon. Vicary Gibbs.
3. Rev. T. McMurdie.

Class 24.—Marrows.

1. Hon. Vicary Gibbs.
2. Mr. J. J. Staward.
3. W. H. Myers, Esq.

Class 25.—Mushrooms.

1. W. H. Myers, Esq.
2. Hon. Vicary Gibbs.
3. T. Jones, Esq.

Class 26.—Onions, Round or Globular.

1. Mrs. Jenner.
2. Mrs. T. Goff.
3. Mr. J. J. Staward.

Class 27.—Onions, Flat.

1. Mrs. Jenner.
2. W. H. Myers, Esq.
3. Mr. J. J. Staward.

Class 28.—Parsnips, Long.

1. Lord North.
2. Rev. T. McMurdie.
3. F. J. Barrett, Esq.

Class 28a.—Parsnips, Short.

No first.
2. Rev. T. McMurdie.
No third.

Class 29.—Carrots, Long.

1. Hon. Vicary Gibbs.
2. Rev. T. McMurdie.
3. F. J. Barrett, Esq.

Class 30.—Carrots, Stump-rooted or Short.

1. F. J. Barrett, Esq.
2. Mrs. E. H. Denison.
3. Rev. T. McMurdie.

Class 31.—Peas.

1. Hon. Vicary Gibbs.
2. F. J. Barrett, Esq.
3. W. H. Myers, Esq.

Class 32.—Turnips, White Skin and Flesh.

1. Rt. Hon. T. F. Halsey.
2. Mr. J. J. Staward.
3. Sir Francis Lloyd, Aston Hall, Oswestry (gr. Mr. W. Staward).

Class 33.—Turnips, parti-coloured.

1. Mrs. Jenner.
2. Mr. H. Keep.
3. Hon. Vicary Gibbs.

Class 34.—Turnips, yellow flesh.

1. Hon. Vicary Gibbs.
2. Sir Francis Lloyd.
3. T. Jones, Esq.

Class 35.—Potatos, white.

1. Mrs. M. Knox.
2. G. Thorn, Esq.
3. Mrs. E. H. Denison.

Class 36.—Potatos, coloured.

1. G. Thorn, Esq.
2. Rev. T. G. Wyatt, St. Wilfrid's, Hayward's Heath (gr. Mr. J. E. Shirley).
3. Mrs. E. H. Denison.

Class 37.—Kale, Dwarf.

1. T. Jones, Esq.
2. Mrs. L. Davis.
3. H. W. Henderson, Esq.

Class 38.—Kale, Tall.

1. H. W. Henderson, Esq.
2. Hon. Vicary Gibbs.

No third

Class 39.—Tomatos, Red.

1. Lord Foley.
2. F. Bibby, Esq.
3. Mr. J. J. Staward.

Class 40.—Tomatos, Yellow.

1. Lord Foley.
2. Hon. Vicary Gibbs.
3. F. Bibby, Esq.

Class 41.—Tomatos, Ornamental.

1. F. Bibby, Esq.
2. Sir Francis Lloyd.
3. Mrs. E. H. Denison.

Class 42.—Any other Vegetable not named in the Schedule.

1. Hon. Vicary Gibbs.
2. Rev. T. McMurdie.
3. Mr. P. B. Awcock.

CHAMPION CHALLENGE CUP.

The Champion Cup will be held for one year (subject to a guarantee of its return in good condition) by the winner of the greatest number of First Prize points throughout the whole Exhibition, the winner in Class 1 being excluded. An Exhibitor may win this cup only once in three years, but the winner may compete the following year, and if adjudged first in these two successive years will receive a smaller commemorative Cup. In calculating for this Champion Cup the number of points reckoned for each First Prize are as follows :—

Class 2	9	Points each
Classes 3, 4, 7	6	,, ,,
Classes 5, 6, 8, 9	4	,, ,,
All other Classes	1	,, ,,

In case of an equality (and only in that case) Second Prizes are counted, in order to arrive at a decision, each Second Prize counting half the points allotted to the First Prize.

W. H. Myers, Esq., 19 points.

DAHLIA SHOW.

SEPTEMBER 23, 1913.

Class A. Amateurs.—A Group of Decorative Garden Dahlias of all or any sections. 12 feet run of 3 feet tabling, not built up more than 8 feet in height from the ground level.

First Prize :—R.H.S. Silver Cup and the Veitch Memorial Medal.

1. Rev. A. Bridge, Worth Rectory, Three Bridges (gr. Mr. C. Daisley).

Silver Banksian Medal : H.R.H. The Duchess of Albany, Claremont, Esher (gr. Mr. J. S. Kelly).

Silver Banksian Medal : Sir Randolf Baker, Bart., Ranston, Blandford (gr. Mr. A. E. Usher).

Class B. Open.—A Group of Decorative Garden Dahlias of all or any sections. 25 feet run of 3 feet tabling, not built up more than 8 feet in height from the ground level.

First Prize :—Seventy-five Guinea Challenge Cup, presented to the R.H.S. by Reginald Cory, Esq.

The winner will hold the Cory Cup for one year subject to a sufficient Insurance against loss, and to a guarantee to return it in good condition, or, failing this, to refund to the R.H.S. the sum of Eighty Guineas. On the return of the Cup the Council will present the holder with a small commemorative silver cup.

Cory Cup : Messrs. Carter Page, 53 London Wall, E.C.

Silver-gilt Flora Medal : Messrs. J. Cheal, Crawley.

Silver-gilt Banksian Medal : Messrs. Hobbies, Dereham, Norfolk.

Silver Flora Medal : Messrs. Keynes, Williams, Salisbury.

Silver Banksian Medal : Messrs. Warnaar, Sassenheim, Holland.

Silver Banksian Medal : Mr. J. T. West, Tower Hill, Brentwood.

NINETEENTH ANNUAL EXHIBITION OF BRITISH-GROWN FRUIT.

HELD AT THE SOCIETY'S HALL, VINCENT SQUARE, S.W.,

SEPTEMBER 25 AND 26, 1913.

THE JUDGES.

Allan, A. R., Hillingdon Court Gardens, Uxbridge.

Allan, W., Gunton Park Gardens, Norwich.

Arnold, T., Cirencester Park Gardens, Gloucester.

Bacon, W. H., Mote Park Gardens, Maidstone.

Barnes, N. F., Eaton Hall Gardens, Chester.

Basham, J., Bassaleg, Newport, Mon.
Bates, W., Cross Deep Gardens, Twickenham.
Beckett, E., V.M.H., Aldenham House Gardens, Elstree.
Bowerman, J., Southcote Manor Gardens, Reading.
Challis, T., V.M.H., Wilton House Gardens, Salisbury.
Cheal, A., Lowfield Heath, Crawley, Sussex.
Coomber, T., V.M.H., The Hendre Gardens, Monmouth.
Cornford, J., Quex Park Gardens, Birchington.
Crouch, C., St. Anne's Hill Gardens, Chertsey.
Crump, W., V.M.H., Madresfield Court Gardens, Malvern.
Davis, J., The Garden, Brackenhurst, Pembury, Kent.
Divers, W. H., V.M.H., Belvoir Castle Gardens, Grantham.
Doe, J., Rufford Gardens, Ollerton, Notts.
Earp, W., Bayham Abbey Gardens, Lamberhurst.
Fielder, C. R., V.M.H., The Gardens, Great Warley, Brentwood.
Goodacre, J. H., V.M.H., Elvaston Castle Gardens, Derby.
Grubb, A., Porters Park Gardens, Shenley, Herts.
Jaques, J., Grey Friars, Chorley Wood, Herts.
Mackellar, A., V.M.H., Royal Gardens, Windsor.
Markham, H., Wrotham Park Gardens, High Barnet.
Molyneux, E., V.M.H., Swanmore Park Gardens, Bishops Waltham.
Mortimer, S., Rowledge, Farnham, Surrey.
Paul, G., V.M.H., J.P., Cheshunt, Herts.
Pearson, A. H., V.M.H., The Hut, Lowdham, Notts.
Pope, W., Welford Park Gardens, Newbury.
Poupart, W., Marsh Farm, Twickenham.
Reynolds, G., Gunnersbury Park Gardens, Acton, W.
Rivers, H. S., Sawbridgeworth.
Ross, C., V.M.H., 25 Westbury Road, Westgate-on-Sea.
Salter, C. J., Normanhurst Gardens, Rusper, Horsham.
Smith, A. C., Hatchford Park Farm, Cobham, Surrey.
Smith, J. R., Bedgebury Park Gardens, Goudhurst, Kent.
Turton, T., Sherborne Castle Gardens, Dorset.
Veitch, P. C. M., J.P., New North Road, Exeter.
Vert, J., Chirk Castle Gardens, Ruabon.
Ward, A., Godinton Gardens, Ashford, Kent.
Weston, J. G., Eastwell Park Gardens, Ashford, Kent.
Whittle, J., Cheveney Gardens, Hunton, Kent.
Williams, H. H., Pencalenick, Truro.
Woodward, G., Barham Court Gardens, Teston, Maidstone.
Wythes, G., V.M.H., Maryville, Chart Road, Folkestone.

THE REFEREES.

Bunyard, G., V.M.H., Royal Nurseries, Maidstone.
Hudson, J., V.M.H., Gunnersbury House Gardens, Acton, W.
Metcalfe, A. W., Luton Hoo Gardens, Beds.
Thomas, O., V.M.H., 25 Waldeck Road, West Ealing.

OFFICIAL PRIZE LIST.

The Owner's name and address and the Gardener's name are entered on the first occurrence, but afterwards only the Owner's name is recorded.

Division I.

Fruits Grown under Glass or Otherwise.

Open to Gardeners and Amateurs only.

Note.—Exhibitors were permitted to compete in one Class only of Classes 1, 2, and of Classes 3, 4.

Class 1.—Collection of nine dishes of ripe dessert fruit: six kinds at least; only one Pine, one Melon, one Black and one White Grape allowed: not more than two varieties of any other kind, and no two dishes of the same variety.

First Prize, Silver Cup and £5; Second, £5; Third, £3.

1. Duke of Newcastle, Clumber, Worksop (gr. Mr. S. Barker).
2. Lady Henry Somerset, Eastnor Castle, Ledbury (gr. Mr. G. Mullins).
3. Earl of Harrington, Elvaston, Derby (gr. Mr. J. H. Goodacre).

Class 2.—Collection of six dishes of ripe dessert fruit: four kinds at least; only one Melon, one Black and one White Grape allowed; not more than two varieties of any other kind, and no two dishes of the same variety. Pines excluded.

First Prize, Silver Cup and £3; Second, £3; Third, £2.

1. Lord Hillingdon, Wildernesse, Sevenoaks (gr. Mr. J. Shelton).
2. Lord Belper, Kingston Hall, Derby (gr. Mr. W. H. Cooke).
3. C. A. Cain, Esq., The Node, Welwyn, Herts (gr. Mr. T. Pateman).

Class 3.—Grapes, six distinct varieties (two bunches of each), of which two at least must be white.

First Prize, Silver Cup and £6; Second, £6; Third, £4.

1. Duke of Newcastle.
2. Earl of Harrington.
3. C. Bayer, Esq., Tewkesbury Lodge, Forest Hill (gr. Mr. E. C. Wickens).

Class 4.—Grapes, four varieties, selected from the following: 'Madresfield Court,' 'Prince of Wales,' 'Muscat Hamburgh,' 'Muscat of Alexandria' or 'Canon Hall' (not both), 'Mrs. Pearson,' and 'Dr. Hogg,' two bunches of each.

First Prize, Silver Cup and £3; Second, £3; Third, £2.

No entry.

Class 5.—Grapes, 'Black Hamburgh,' two bunches.
First Prize, £2; Second, £1 10s.; Third, £1.

1. Lord Hillingdon.
2. Lady Henry Somerset.
3. Duke of Newcastle.

Class 6.—Grapes, 'Mrs. Pince,' two bunches.
First Prize, £2; Second, £1 10s.

1. H. St. Maur, Esq., Stover Park, Newton Abbot (gr. Mr. G. Richardson).
2. Lady Henry Somerset.

Class 7.—Grapes, 'Alicante,' two bunches.
First Prize, £2; Second, £1 10s.; Third, £1.

1. Lady Henry Somerset.
2. Marquis of Salisbury, Hatfield House, Herts (gr. Mr. H. Prime).
3. Mrs. W. G. Raphael, Castle Hill, Englefield Green (gr. Mr. H. H. Brown).

Class 8.—Grapes, 'Madresfield Court,' two bunches.
First Prize, £2; Second, £1 10s.; Third, £1.

1. Duke of Newcastle.
2. Earl of Harrington.
3. Lord Hillingdon.

Class 9.—Grapes, 'Prince of Wales,' two bunches.
First Prize, £2; Second, £1 10s.

1. Sir Walpole Greenwell, Marden Park, Surrey (gr. Mr. W. Lintott).
2. H. H. Konig, Esq., Ardenrun Place, Blindley Heath (gr. Mr. H. J. Alderman).

Class 10.—Grapes, any other Black Grape, two bunches.
First Prize, £2; Second, £1 10s.; Third, £1.

1. Lady Henry Somerset.
2. Colonel the Hon. C. Harbord, Gunton Park, Norwich (gr. Mr. W. Allan).
3. Marquis of Salisbury.

Class 11.—Grapes, 'Muscat of Alexandria,' two bunches.
First Prize, Silver Knightian Medal and £2; Second, £2; Third, £1 10s.

1. Sir Edwin Durning-Lawrence, Bt., King's Ride, Ascot (gr. Mr. W. Lane).
2. Col. the Hon. C. Harbord.
3. G. Miller, Esq., Newberries, Radlett, Herts (gr. Mr. J. Kidd).

Class 12.—Grapes, any other White Grape, two bunches.

First Prize, £1 10s.; Second, £1; Third, 10s.

1. Duke of Wellington, K.G., Strathfieldsaye, Mortimer (gr. Mr. A. G. Nichols).
2. C. A. Cain, Esq.
3. H. W. Henderson, Esq., Serge Hill, King's Langley (gr. Mr. F. L. Pike).

Class 13.—Collection of Hardy Fruits, in a space not exceeding 12 × 3 feet.

Thirty dishes distinct, grown entirely in the open; not more than twelve varieties of Apples or eight of Pears.

First Prize, Silver Cup and £2; Second, £2; Third, £1 10s.

1. Major Powell Cotton, Quex Park, Birchington (gr. Mr. J. Cornford).
2. Sir Marcus Samuel, Bart., The Mote Park, Maidstone (gr. Mr. W. H. Bacon).

No third.

Division II.

Open to Nurserymen only.

Nurserymen and Market Growers must exhibit as individuals or as firms. *They must have actually grown all they exhibit.* Combinations of individuals or firms are not allowed, nor the collection of produce from different districts.

Exhibitors were permitted to enter in one only of Classes 14 to 16; or in one of 18, 19, and 20.

Nurserymen and Market Growers may adopt any method of staging and number of fruits to a dish they desire. The use of berries and foliage plants is allowed for decoration, but not flowers.

For Fruit Grown entirely out of Doors.

Class 14.—30 feet run of 6 feet tabling.

Gold Medal: Messrs. H. Cannell, Eynsford, Kent.
Silver-gilt Hogg Medal: Messrs. G. Bunyard, Maidstone.
Silver-gilt Knightian Medal: Messrs. J. Cheal, Crawley.
Silver-gilt Banksian Medal: King's Acre Nurseries, Hereford.
Silver Knightian Medal: Messrs. W. Seabrook, Chelmsford.

Class 15.—20 feet run of 6 feet tabling.

Silver-gilt Knightian Medal: Mr. R. C. Notcutt, Woodbridge.
Silver-gilt Banksian Medal: Messrs. Laxton, Bedford.
Silver Knightian Medal: Messrs. S. Spooner, Hounslow.

Class 16.—12 feet run of 6 feet tabling.

Silver-gilt Banksian Medal: Barnham Nurseries, Barnham, Sussex.
Silver Knightian Medal: Messrs. Paul, Cheshunt.
Silver Banksian Medal: Mr. G. W. Miller, Wisbech.

For Orchard House Fruit and Trees.

Class 17.—24 feet by 6 feet of stage. Grapes excluded.

Gold Medal: Messrs. T. Rivers, Sawbridgeworth.

Silver-gilt Hogg Medal: Messrs. G. Bunyard.

Silver-gilt Knightian Medal: King's Acre Nurseries.

Division III.

Open to Market Growers only.

Class 18.—Apples, twenty baskets of (cooking and dessert, distinct).

Silver Cup: Messrs. Gaskain and Whiting, Dargate, Faversham.

Class 19.—Apples, twelve baskets of (six cooking and six dessert, distinct).

Silver-gilt Medal of the Fruiterers' Company: Col. Honeyball, Teynham, Kent.

Silver-gilt Knightian Medal: Swanley Horticultural College, Kent (Principal Miss F. R. Wilkinson).

Silver Knightian Medal: Mr. H. Lumley Webb, Ham Green, Upchurch, Sittingbourne.

Class 20.—Pears, six baskets of, distinct.

No entry.

Division IV.

Fruits grown entirely in the open air.

Open to Gardeners and Amateurs only.

Nurserymen and Market Growers excluded.

Exhibitors of Apples or Pears in Division IV. were excluded from Division VI.

Note.—Exhibitors were permitted to compete in one class only of the Classes 21, 22, 23; or 26, 27, 28.

Class 21.—Apples, twenty-four dishes distinct, sixteen cooking, eight dessert. The latter placed in the front row.

First Prize, Silver Cup and £3; Second, £4; Third, £3.

1. Col. A. C. Borton, Cheveney, Hunton, Kent (gr. Mr. J. Whittle).
2. Sir Marcus Samuel, Bart.
3. C. A. Cain, Esq.

Class 22.—Apples, eighteen dishes distinct, twelve cooking, six dessert. The latter placed in the front row.

First Prize, Fruiterers' Company Silver Medal and £3; Second, £2; Third, £1.

1. H. G. Kleinwort, Esq., Wierton Place, Maidstone (gr. Mr. B. J. Mercer).
2. Major Powell Cotton.
3. J. T. Charlesworth, Esq., Nutfield Court, Surrey (gr. Mr. T. W. Herbert).

Class 23.—Apples, twelve dishes distinct, eight cooking, four dessert. The latter placed in the front row.

First Prize, Silver Banksian Medal and £2; Second, £1; Third, 15s

1. Lady Henry Somerset.
2. G. Miller, Esq.
3. Mrs. T. Goff, Sherfield Hall, Basingstoke (gr. Mr. H. E. Wallis).

Class 24.—Cooking Apples, six dishes distinct.

First Prize, £1; Second, 15s.; Third, 10s.

1. Col. A. C. Borton.
2. Sir Marcus Samuel, Bart.
3. Lady Henry Somerset.

Class 25.—Dessert Apples, six dishes distinct.

First Prize, £1; Second, 15s.; Third, 10s.

1. Lady Henry Somerset.
2. Sir Marcus Samuel, Bart.
3. Col. A. C. Borton.

Class 26.—Dessert Pears, eighteen dishes distinct.

First Prize, Silver Cup and £2; Second, £3; Third, £2.

1. Sir Marcus Samuel, Bart.
2. Col. A. C. Borton.
3. C. A. Cain, Esq.

Class 27.—Dessert Pears, twelve dishes distinct.

First Prize, Fruiterers' Company Silver Medal and £2; Second, £1 10s.; Third, £1.

1. Major Powell Cotton.
2. No second.
3. G. Miller, Esq.

Class 28.—Dessert Pears, nine dishes distinct.

First Prize, £1 10s.; Second, £1.

1. Lord Hillingdon.

No second.

Class 29.—Dessert Pears, six dishes distinct.

First Prize, £1; Second, 15s.

1. Col. A. C. Borton.
2. H. G. Kleinwort, Esq.

Class 30.—Stewing Pears, three dishes distinct.

First Prize, 15s.; Second, 10s.

1. Major Powell Cotton.

No second.

Class 31.—Plums, three dishes distinct.

First Prize, £1; Second, 10s.

1. C. H. Berners, Esq., Woolverstone Park, Ipswich (gr. Mr. W. Messenger).
2. Mrs. Bankes, Kingston Lacy, Wimborne (gr. Mr. J. Hill).

Class 32.—Damsons, or Bullaces, three dishes distinct.

First Prize, 10*s.*; Second, 7*s.* 6*d.*

1. J. G. Williams, Esq., Pendley Manor, Tring (gr. Mr. F. G. Gerrish).

No second.

Class 33.—Morello Cherries, fifty fruits.

First Prize, 7*s.*; Second, 5*s.*

1. Lady Henry Somerset.
2. J. G. Williams, Esq.

Division V.

Special District County Prizes.

Open to Gardeners and Amateurs only.

(In this Division all fruit must have been grown entirely in the open.)

N.B.—Exhibitors in Division V. were not permitted to compete in Divisions II. or III. or in Classes 1, 2, 3, 4, 13, 21, 22, 23, 24, 26, 27, 28.

AA.—Apples, six dishes distinct, four cooking, two dessert.

First Prize, £1 and third-class single fare from Exhibitor's nearest railway station to London.

Second Prize, 15*s.* and railway fare as above.

BB.—Dessert Pears, six dishes distinct.

First Prize, £1 10*s.* and railway fare as above.
Second Prize, £1 and railway fare as above.

In the event of the same Exhibitor being successful in both classes AA and BB only one railway fare was paid; and no railway fare was paid if the fruit is sent up for the Society's officers to unpack and stage.

Class 34. Open only to Kent Growers.

AA. 1. G. H. Landon, Esq., Olantigh Towers, Wye (gr. Mr. J. Bond).
2. Capt. S. G. Reid, The Elms, Yalding (gr. Mr. J. Coleman).

BB. 1. Capt. S. G. Reid.
2. G. H. Landon, Esq.

Class 35.—Open only to growers in Surrey, Sussex, Hants, Dorset, Somerset, Devon, and Cornwall.

AA. 1. J. A. Stidston, Esq., Bishopsteignton, Teignmouth.
2. C. H. Combe, Esq., Cobham Park, Surrey (gr. Mr. A. Tidy).

BB. 1. F. J. B. Wingfield Digby, Esq., Sherborne Castle, Dorset (gr. Mr. T. Turton).
2. Mrs. Bankes.

Class 36.—Open only to growers in Wilts, Gloucester, Oxford, Bucks, Berks, Beds, Herts, and Middlesex.

AA. { 1. C. Gurney, Esq., Henlow Grange, Biggleswade (gr. Mr. A. Carlisle).
2. Earl of Suffolk, Charlton Park, Malmesbury (gr. Mr. T. J. Finch).

BB. { 1. C. Gurney, Esq.
2. J. B. Fortescue, Esq., Dropmore, Maidenhead (gr. Mr. C. Page).

Class 37.—Open only to growers in Essex, Suffolk, Norfolk, Cambridge, Hunts, and Rutland.

AA. { 1. Rt. Hon. J. W. Lowther, Campsea Ashe, Wickham Market (gr. Mr. A. Andrews).
2. Sir Montagu Turner, Bedfords, Havering, Romford (gr. Mr. A. Humphreys).

BB. { 1. Col. B. J. Petre, Westwick House, Norwich (gr. Mr. G. Davison).
2. Col. the Hon. C. Harbord.

Class 38.—Open only to growers in Lincoln, Northampton, Warwick, Leicester, Notts, Derby, Staffs, Shropshire, and Cheshire.

AA. { 1. F. Bibby, Esq., Hardwicke Grange, Shrewsbury (gr. Mr. J. Taylor).
No second.

BB. { 1. F. Bibby, Esq.
No second.

Class 39.—Open only to growers in Worcester, Hereford, Monmouth, Glamorgan, Carmarthen, and Pembroke.

AA. { 1. F. Paget Norbury, Esq., The Norrest, Malvern.
2. Mr. C. Crooks, Impney Gardens, Droitwich.

BB. { 1. Mr. C. Crooks.
No second.

Class 40.—Open only to growers in the other Counties of Wales.

AA. { 1. T. Jones, Esq., Bryn Penylan, Ruabon.
No second.

BB. { 1. T. Jones, Esq.
No second.

Class 41.—Open only to growers in the six northern Counties of England, and in the Isle of Man.

AA. { 1. Earl of Londesborough, Londesborough Park, Market Weighton (gr. Mr. J. C. McPherson).
No second.

BB. { 1. Earl of Londesborough.
No second.

Class 42.—Open only to growers in Scotland.

AA. 1. C. L. Gordon, Esq., Threave House, Castle Douglas (gr. Mr. J. Duff).
2. Mr. J. J. Staward, St. Fort Gardens, Newport, Fife.

BB. No entry.

Class 43.—Open only to growers in Ireland.

AA. 1. Earl of Bessborough, Bessborough, Piltown, Co. Kilkenny.
2. C. B. Broad, Esq., Aghern, Conna, Co. Cork.

BB. 1. J. Congreve, Esq., Mount Congreve, Waterford (gr. Mr. D. Smartt).
No second.

Class 44.—Open only to growers in the Channel Islands.

No entry.

Division VI.

Single Dishes of Fruit Grown entirely in the Open Air.

Six Fruits to a Dish.

Open to Gardeners and Amateurs only.
Nurserymen and Market Growers excluded.

All the varieties named in Division VI. are excellent and worthy of general cultivation.

Prizes in each Class, except 74, 75, 120, 148, and 149, as follows:—
First Prize, 7*s.*; Second Prize, 5*s.*

Choice Dessert Apples.

N.B.—The Judges were instructed to prefer Quality, Colour, and Finish to mere size.

[An Exhibitor was permitted to show only one dish in each Class.]

Class 45.—Adams' Pearmain.

1. Earl of Suffolk.
2. Mrs. Bankes.

Class 46.—Allington Pippin.

1. W. Castle, Esq., Holland House, Barton Mills (gr. Mr. J. Reynolds).
2. J. Copp, Esq., Ferndale, Teignmouth.

Class 47.—American Mother.

1. Rev. T. McMurdie, Woburn Park, Weybridge (gr. Mr. A. Basile).
2. G. H. Landon, Esq.

Class 48.—Barnack Beauty.

1. Mr. C. Crooks.
2. Rev. T. McMurdie.

Class 49. Belle de Boskoop.

1. Capt. S. G. Reid.
2. F. J. B. Wingfield Digby, Esq.

Class 50.—Ben's Red.

1. C. H. Berners, Esq.
2. Capt. S. G. Reid.

Class 51.—Blenheim Orange.

1. J. Walter, Esq., Bearwood, Wokingham (gr. Mr. J. T. Tubb).
2. Rev. J. R. Leigh, Yalding Vicarage, Kent (gr. Mr. G. Johnson).

Class 52.—Charles Ross.

1. Rev. H. A. Bull, Wellington House, Westgate-on-Sea (gr. Mr. F. King).
2. H. St. Maur, Esq.

Extra 3. F. Paget Norbury, Esq.

Class 53.—Christmas Pearmain.

1. Rev. T. McMurdie.
2. Capt. S. G. Reid.

Class 54.—Claygate Pearmain.

1. C. Gurney, Esq.
2. F. J. B. Wingfield Digby, Esq.

Class 55.—Cockle's Pippin.

1. C. H. Combe, Esq.
2. Earl of Devon, Powderham Castle, Exeter (gr. Mr. T. H. Bolton).

Class 56.—Coronation.

1. H. St. Maur, Esq.
2. G. H. Landon, Esq.

Class 57.—Cox's Orange.

1. H.R.H. the Duchess of Albany, Claremont, Esher, Surrey (gr. Mr. J. S. Kelly).
2. F. Paget Norbury, Esq.

Class 58.—Duke of Devonshire.

1. Capt. S. G. Reid.
2. The Duke of Wellington, K.G.

Class 59.—Egremont Russet.

1. G. H. Landon, Esq.
2. Capt. S. G. Reid.

Class 60.—Houblon.

No entry.

Class 61.—James Grieve.

1. F. Paget Norbury, Esq.
2. Capt. S. G. Reid.

Class 62.—King of Tompkins County (small fruits).
1. C. H. Combe, Esq.
2. Duke of Newcastle.

Class 63.—Lord Hindlip.
1. Earl of Suffolk.
2. G. H. Landon, Esq.

Class 64.—Mannington Pearmain.
1. Mrs. Bankes.
2. I. Lewis, Esq., Bedgebury Park, Goudhurst, Kent (gr. Mr. J. R. Smith).

Class 65.—Margil.
1. Rev. T. McMurdie.
2. I. Lewis, Esq.

Class 66.—Reinette du Canada.
1. H. St. Maur, Esq.
No second.

Class 67.—Ribston Pippin.
1. Col. the Hon. C. Harbord.
2. C. H. Combe, Esq.

Class 68.—Rival.
1. C. H. Berners, Esq.
2. Earl of Suffolk.
Extra 3.—Capt. S. G. Reid.

Class 69.—Scarlet Nonpareil.
No first.
2. J. B. Fortescue, Esq.

Class 70.—St. Edmund's Pippin.
1. J. Walter, Esq.
2. F. J. B. Wingfield Digby, Esq.

Class 71.—St. Everard.
1. J. B. Fortescue, Esq.
2. G. H. Mould, Esq., Papworth St. Everard, Cambridge.

Class 72.—Wealthy.
1. Rev. T. McMurdie.
2. J. Walter, Esq.
Extra 3. Capt. S. G. Reid.

Class 73.—William Crump.
No entry.

Class 74.—Eight fruits of any early variety, not named above, fit for use.

Four Prizes, 7*s*., 6*s*., 5*s*., 4*s*.

1. Rt. Hon. J. W. Lowther.
2. Col. the Hon. C. Harbord.
3. Sir Montagu Turner.
4. F. Paget Norbury, Esq.

Class 75.—Eight fruits of any late variety, not named above.

Four Prizes, 7*s*., 6*s*., 5*s*., 4*s*.

1. H. St. Maur, Esq.
2. J. Walter, Esq.
3. C. H. Berners, Esq.
4. W. A. Voss, Esq., Fairlight Glen, Rayleigh, Essex.

Choice Cooking Apples.

Class 76.—Alfriston.

1. C. H. Combe, Esq.
2. Capt. S. G. Reid.

Class 77.—Annie Elizabeth.

1. Capt. S. G. Reid.
2. F. J. B. Wingfield Digby, Esq.

Class 78.—Beauty of Kent.

1. Col. the Hon. C. Harbord.
2. J. B. Fortescue, Esq.

Class 79.—Bismarck.

1. Capt. S. G. Reid.
2. E. E. Pearson, Esq., Brickendonbury, Hertford (gr. Mr. W. Stephenson).

Class 80.—Blenheim Orange (large fruits).

1. H. Edgell, Esq., Hickling, Norfolk.
2. Duke of Wellington.

Class 81.—Bramley's Seedling.

1. E. G. Mocatta, Esq., Woburn Place, Addlestone, Surrey (gr. Mr. T. Stevenson).
2. E. E. Pearson, Esq.

Class 82.—Byford Wonder.

No entry.

Class 83.—Crimson Bramley.

No entry.

Class 84.—Dumelow's Seedling, *syn.* Wellington, and Normanton Wonder.

1. H. St. Maur, Esq.
2. Duke of Wellington.

Class 85.—Ecklinville.

1. Rev. T. McMurdie.
2. J. B. Fortescue, Esq.

Class 86.—Edward VII.

1. Rt. Hon. J. W. Lowther.
2. Capt. S. G. Reid.

Class 87.—Emneth Early, *syn.* Early Victoria.

1. I. Lewis, Esq.

No second.

Class 88.—Emperor Alexander.

1. E. E. Pearson, Esq.
2. Rt. Hon. J. W. Lowther.

Class 89.—Encore.

No entry.

Class 90.—Gascoyne's Scarlet, large fruits.

1. Duke of Wellington.
2. Earl of Suffolk.

Class 91.—Golden Noble.

1. Rt. Hon. J. W. Lowther.
2. Earl of Devon.

Class 92.—Grenadier.

1. Earl of Bessborough.
2. J. B. Fortescue, Esq.

Class 93.—Hambling's Seedling.

1. Earl of Bessborough.
2. H. St. Maur, Esq.

Class 94.—Hector Macdonald.

1. J. Copp, Esq.
2. C. B. Broad, Esq.

Class 95.—Hormead Pearmain.

1. Capt. S. G. Reid.
2. J. B. Fortescue, Esq.

Class 96.—King of Tompkins County (large fruits).

1. Capt. S. G. Reid.
2. C. H. Combe, Esq.

Class 97.—Lane's Prince Albert.

1. E. E. Pearson, Esq.
2. G. H. Landon, Esq.

Class 98.—Lord Derby.

1. Rev. J. R. Leigh.
2. Col. B. J. Petre.

Class 99.—Mère de Ménage.

1. H. St. Maur, Esq.
2. Col. B. J. Petre.

Class 100.—Newton Wonder.

1. Capt. S. G. Reid.
2. F. J. B. Wingfield Digby, Esq.

Class 101.—Norfolk Beauty.

1. Rt. Hon. J. W. Lowther.
2. Col. the Hon. C. Harbord.

Class 102.—Peasgood's Nonesuch.

1. Rt. Hon. J. W. Lowther.
2. H. St. Maur, Esq.

Class 103.—Potts' Seedling.

1. Capt. S. G. Reid.
2. F. J. B. Wingfield Digby, Esq.

Class 104.—Rev. W. Wilks.

1. H. W. Henderson, Esq.
2. Sir Walpole Greenwell.

Class 105.—Royal Jubilee.

1. Rt. Hon. J. W. Lowther.
2. J. Walter, Esq.

Class 106.—Stirling Castle.

1. F. Paget Norbury, Esq.
2. Earl of Devon.

Class 107.—The Queen.

1. Rt. Hon. J. W. Lowther.
2. G. H. Landon, Esq.

Class 108.—Tower of Glamis.

1. C. H. Combe, Esq.
2. Rt. Hon. J. W. Lowther.

Class 109.—Warner's King.

1. H. St. Maur, Esq.
2. Rev. H. A. Bull.

Class 110.—Eight Fruits of any other variety not named above.
Four Prizes, 7*s*., 6*s*., 5*s*., 4*s*.

1. Earl of Bessborough.
2. Rev. J. R. Leigh.
3. Capt. S. G. Reid.
4. Earl of Devon.

Choice Dessert Pears.

Class 111.—Beurré Alexander Lucas.

1. F. J. B. Wingfield Digby, Esq.
2. H.R.H. The Duchess of Albany.

Class 112.—Beurré d'Amanlis.

1. Lord Foley, Ruxley Lodge, Claygate, Surrey (gr. Mr. H. C. Gardner).
2. Sir Walpole Greenwell.

Class 113.—Beurré d'Anjou.

1. F. J. B. Wingfield Digby, Esq.
2. J. B. Fortescue, Esq.

Class 114.—Beurré d'Avalon, *syn.* Porch's Beurré and Glastonbury.

No entry.

Class 115.—Beurré Bosc.

1. F. J. B. Wingfield Digby, Esq.
2. Rev. T. McMurdie.

Class 116.—Beurré de Naghin.

No entry.

Class 117.—Beurré Dumont.

1. Rev. T. McMurdie.
2. Col. the Hon. C. Harbord.

Class 118.—Beurré Hardy.

1. C. H. Berners, Esq.
2. Rev. H. A. Bull.

Class 119.—Beurré Perran, *syn.* President Barabé.

1. Col. the Hon. C. Harbord.
2. F. J. B. Wingfield Digby, Esq.

Class 120.—Beurré Superfin.

1. F. J. B. Wingfield Digby, Esq.
2. C. H. Berners, Esq.

Class 121.—Blickling.

1. Col. the Hon. C. Harbord.

No second.

Class 122.—Charles Ernest.

1. Col. B. J. Petre.
2. F. J. B. Wingfield Digby, Esq.

Class 123.—Comte de Lamy.

1. C. H. Combe, Esq.
2. J. B. Fortescue, Esq.

Class 124.—Conference.

1. Col. B. J. Petre.
2. F. R. Rodd, Esq., Trebartha Hall, Launceston (gr. Mr. F. A. Billings).

Class 125.—Directeur Hardy.

1. F. Bibby, Esq.

No second.

Class 126.—Doyenné du Comice.

1. Col. B. J. Petre.
2. F. J. B. Wingfield Digby, Esq.

Class 127.—Durondeau.

1. Col. B. J. Petre.
2. Col. the Hon. C. Harbord.

Class 128.—Easter Beurré.

1. Col. B. J. Petre.
2. C. H. Combe, Esq.

Class 129.—Émile d'Heyst.

1. C. H. Berners, Esq.
2. Col. B. J. Petre.

Class 130.—Fondante d'Automne.

1. Col. the Hon. C. Harbord.
2. W. Castle, Esq.

Class 131.—Fondante Thirriot.

1. C. H. Berners, Esq.
2. J. B. Fortescue, Esq.

Class 132.—Glou Morceau.

1. Col. B. J. Petre.
2. Rev. T. McMurdie.

Class 133.—Gratioli of Jersey.

1. Col. the Hon. C. Harbord.

No second.

Class 134.—Josephine de Malines.

1. F. J. B. Wingfield Digby, Esq.
2. Mrs. Bankes.

Class 135.—Le Brun.

1. F. R. Rodd, Esq.
2. Rev. T. McMurdie.

Class 136.—Le Lectier.

1. E. G. Mocatta, Esq.
2. Mrs. Bankes.

Class 137.—Louise Bonne of Jersey.

1. G. H. Landon, Esq.
2. Col. the Hon. C. Harbord.

Class 138.—Marie Benoist.

No entry.

Class 139.—Marie Louise.

1. Col. B. J. Petre.
2. Col. the Hon. C. Harbord.

Class 140.—Nouvelle Fulvie.

1. Col. B. J. Petre.
2. Mrs. Bankes.

Class 141.—Olivier des Serres.

1. F. J. B. Wingfield Digby, Esq.
2. Capt. S. G. Reid.

Class 142.—Pitmaston Duchess.

1. Col. B. J. Petre.
2. M. Fraser, Esq., Brimley, Teignmouth (gr. Mr. W. Shillabeer).

Class 143.—Santa Claus.

No entry.

Class 144.—Souvenir du Congrès.

1. Rev. T. McMurdie.
2. W. Castle, Esq.

Class 145.—Thompson.

1. Duke of Newcastle.
2. Col. the Hon. C. Harbord.

Class 146.—Triomphe de Vienne.

1. Col. B. J. Petre.
2. Col. the Hon. C. Harbord.

Class 147.—Winter Nélis.

1. F. J. B. Wingfield Digby, Esq.
2. Lord Foley.

Class 148.—Eight Fruits of any early variety not named above.

Four Prizes, 7*s.*, 6*s.*, 5*s.*, 4*s.*

1. Col. the Hon. C. Harbord.
2. Rt. Hon. J. W. Lowther.
3. G. H. Mould, Esq.
4. H. W. Henderson, Esq.

Class 149.—Eight Fruits of any late variety not named above.

Four Prizes, 7*s.*, 6*s.*, 5*s.*, 4*s.*

1. F. J. B. Wingfield Digby, Esq.
2. Col. the Hon. C. Harbord.
3. Mrs. M. P. Mead, St. Mary's, Teddington.
4. I. Lewis, Esq.

Fruit Competition for Affiliated Societies.

Apples and Pears.

Six dishes, distinct, Cooking Apples; six dishes, distinct, Dessert Apples; six dishes, distinct, Dessert Pears, six Fruits to each dish. *Affiliated Societies.* No two Societies were permitted to combine, and each Society competing must collect all the specimens shown from amongst its own members only, and not from outside.

The Affiliated Societies Challenge Cup may be won only once in three years by any one Society; but the Winners may compete for any other prizes offered in this Class.

If the same Society which won the Challenge Cup in 1912 again exhibits and is considered by the Judges to be 1st, a smaller Silver Cup will be awarded by the Council instead of the Medal offered as the 2nd Prize; and similarly in future years a winning Society must win again in the immediately following year in order to establish a claim for the smaller Cup in place of the Silver-gilt Knightian Medal.

First, Challenge Cup to be held for 12 months, and Silver-gilt Knightian Medal; Second, Silver-gilt Banksian Medal.

Challenge Cup and Silver-gilt Knightian Medal.—East Anglian Horticultural Club; Secretary, Mr. W. L. Wallis, 12 Royal Arcade, Norwich.

Standard Cup.—Ipswich and District Gardeners' and Amateurs' Association; Secretary, Mr. F. W. Salmon, 65 Brooks Hall Road, Ipswich.

Silver-gilt Banksian Medal.—Colchester and District Gardeners' Association; Secretary, Mr. W. H. Tanner, 43 East Street, Colchester.

Special Award.

Silver Hogg Memorial Medal.—To Mr. George Pyne, Denver Nurseries, Topsham, Devon, for dish of Apples, 'Rev. W. Wilks.'

DEPUTATION TO KENDAL.

September 24, 1913.

A Deputation consisting of Messrs. Jos. Cheal, H. Somers Rivers, and Jas. Hudson, V.M.H., visited the Show held at Kendal under the auspices of the North of England Horticultural Society on September 24, 1913, when the following awards were made, viz.:—

Gold Medal.

To Lady Nunburnholme, Water Priory, Pocklington, York (gr. Mr. Jordan), for a fine collection of Grapes, Melons, and orchard-house-grown Pears and Apples.

Silver-Gilt Knightian Medal.

To Messrs. Sutton, for Potatos.

To Messrs. Dobbie, for Potatos.

Silver-Gilt Banksian Medal.

To Messrs. Little & Ballantyne, Carlisle, for Apples and Pears grown in the northern counties of England.

Silver Flora Medal.

To Messrs. Geo. Fairbairn, Carlisle, for Dahlias, Sweet Peas, and Carnations.

Silver Knightian Medal.

To Mr. C. Webb, of Kendal, for a collection of fruit.

Silver Banksian Medal.

To Mrs. Clayton, The Chesters (gr. Mr. Cocker), for Apples and Pears.

To the Cumberland and Westmorland County Council, for a collection of fruits grown in their experimental garden by Mr. Little.

To Mr. I. R. Airey, of Kendal, for farm-grown Potatos and other vegetables.

To the Preston Patrick School Gardens, for various vegetables &c.

Bronze Flora Medal.

To Mr. E. S. Fairbairn, Carlisle, for flowers &c.

To the Lakeland Nurseries, Windermere, for hardy flowers.

Bronze Banksian Medal.

To Messrs. Dickson & Robinson, of Manchester, for Onions.

To Mr. G. W. Miller, Wisbech, for Apples.

REPORT OF THE ANNUAL CONFERENCE OF AFFILIATED SOCIETIES AND OF THE UNION OF MUTUAL IMPROVEMENT SOCIETIES.

SEPTEMBER 26, 1913.

The Rev. W. WILKS, M.A., V.M.H., in the Chair.

A VERY successful Conference of the representatives of Affiliated Societies and Societies in Union was held in the Lecture Room of the Royal Horticultural Hall on September 26, when about one hundred delegates were present, the Rev. W. Wilks, M.A., V.M.H., the Secretary of the Royal Horticultural Society, occupying the Chair and welcoming those present on behalf of the Council.

He referred to the changes which must inevitably come to the Society, more particularly with regard to the resignation of the late President, Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., in April last, who had held office uninterruptedly for so long a period as eight-and-twenty years, and, throughout, with such wisdom, tact, and success. This resignation had been keenly felt by all who are closely associated with the Society's work; they had, however, in Field-Marshal Lord Grenfell, G.C.B., G.C.M.G., an admirable

successor, who was throwing himself, heart and soul, into the work, and he had asked the Chairman to express his regret that his necessary attendance upon the King at the Army Manœuvres prevented his being with them that afternoon.

The Chairman also expressed the appreciation by the Council of the good work being done by the different Societies for Horticulture in their respective districts. The R.H.S. had them constantly in mind with a view of giving such assistance as was in their power.

The circulating Lectures, and especially those with lantern slides, were proving very popular and were much sought after. Three new lectures (with slides) have been added to the already long list of those available, namely:

(1) The Vegetation of the Island of St. Leger in Lake Maggiore.
(2) Vegetables for Allotment Gardens.
(3) The International Exhibition.

It having come to the knowledge of the Council that in some country places the slides illustrating the various lectures could not be used for want of a lantern and sheet to show them with, an oil lantern had been purchased for this very purpose and would be lent without charge to societies requiring it, who would only have to pay the carriage each way, and for any damage sustained.

Further, a sum of about £50 had been spent in securing a set of forty self-coloured lantern slides of views in the Society's Gardens. These slides, which were thrown on to the screen, were much admired and showed a considerable advance on the ordinary black-and-white lantern slides. They may be had on hire for *7s. 6d.* an evening, but a guarantee must be given by the Society hiring them that an expert operator will be engaged, who will always use a lantern with a water-bath cooler, and that they will pay 25s. for any slide scorched or broken.

The following results of the 1913 Challenge Cup for Fruit were announced:—

Affiliated Societies' Challenge Cup for Fruit:—

1913. Ipswich placed 1st, but given a R.H.S. Cup as not eligible for the Affiliated Societies' Cup which they won in 1911.
Colchester placed 2nd. Won Cup in 1912, so were given a S.G.B., the 2nd prize under the Schedule.
East Anglian placed 3rd, won the Affiliated Societies' Cup, as the two Societies placed 1st and 2nd were ineligible on account of previous winning.

The CHAIRMAN reported that not a single competitor had entered for the Affiliated Societies' Summer Cup for Herbaceous Flowers, which only asked for thirty bunches—that is, two varieties of each of fifteen kinds, to be staged at the Holland House Show. He hoped that the Committees of the various Societies would at once look into this matter with a view of growing sufficient plants amongst their members to meet this Competition.

The little Gardeners' Diary, prepared by the R.H.S., usually issued at 1*s.* a copy, was offered to Affiliated Societies at the rate of 9*s.* a dozen. Secretaries of Societies should send, as early as possible, to the R.H.S., notices of how many they would require at this reduced rate for sale among their members at the usual rate of 1*s.*

The Affiliated Societies' Award Card, which is now attractively printed in colours, was shown to the Delegates present and was greatly admired. It can be purchased from the Society at the rate of ten copies for 5*s.* This card is intended to be used by Local Societies as a record of awards, commendations, &c., and has a blank space left for the name of the Local Society and of the object commended and the name of the producer.

A paper was presented by the Chairman giving a few further difficulties in Flower Show Schedules, and, as an Addendum, a tentative classification of Stove, Greenhouse, and Hardy Plants. The three lists given in this Addendum were all plants known to have caused confusion under Schedules of Shows. (See page 535.) The Secretary would be glad to hear of any other plants respecting which difficulty has been experienced in placing them under the respective headings.

To assist Allotment-holders and Cottage Gardeners in their Competitions, a set of Rules, with hints to both Exhibitors and Judges, was laid before the Conference. These Rules may be had at twopence a copy, or fifty for 7*s.* 6*d.*

A companion Judges' Sheet in a very convenient book-like form was also shown, which can be had for 2*s.* a dozen. This Judges' Sheet has, in tabulated form, a list of the subjects usually grown in allotment gardens, flower gardens, and for window and wall decoration. The allotments or gardens to be judged are all numbered, and columns are provided in the judging sheet for the points given. The Chairman strongly recommended this Judges' Sheet and the Rules to the attention of kindred Societies.

The Chairman also said that the Society had approached the Board of Agriculture to consider whether a grant could not be given from the Development Fund to help to secure lectures and lecturers in country districts and for the establishment of small libraries of useful and practical gardening books for the benefit of Local Gardeners' Mutual Improvement Societies.

The Diploma Examination was mentioned by the Chairman and its purpose explained.

Mr. JAY, of the St. Barnabas Society, Sutton, gave his report of the progress of his Seed and Manure Club during the past year. He said there were about ninety-seven members in the Club, who contributed between them, in varying amounts not exceeding sixpence a week, the sum of £36. This money had been used for the purchase of manures and seeds, bean rods, pea sticks, &c., which had been procured in large quantities at a substantial discount from ordinary prices. The seeds and manures had been apportioned among the members of the

Club in accordance with their demands and the value of the subscriptions each had paid in. The Club had proved an advantage in many ways, to everyone concerned, not only in the matter of prices but in the superior quality of the goods. The methods adopted were helpful and instructive, particularly in regard to the demonstration of the value of good seed in the better crops secured over poor seed, and the right use of suitable manures, natural and artificial.

The representative of the Hale End Society asked if other Societies could give him any helpful suggestions to encourage exhibitors, who have passed the novice stage, to continue competition with experienced exhibitors. His difficulty was that when once exhibitors have successfully passed the Classes arranged for novices, and are afterwards required to compete with more experienced exhibitors, professional or amateur, failure to secure a prize resulted in ultimate withdrawal from the Competitions.

Considerable discussion followed, but no suggestion was forthcoming which really met the case. The CHAIRMAN said the experience of the Hale End Society was a very general one, and once the Show had helped the novice by giving him a prize for successful competition in the Novice Classes, with that encouragement behind him, there was nothing but grit to tide over the period of work and application lying between the elementary success and a position in the prize list of the more difficult classes. But in the Cottagers' Classes it was a good plan to have a standing rule that no one exhibitor might take more than so much in money, whatever the number of classes he might be awarded prizes in by the Judges. How much exactly this sum of limitation should be must be decided by each Society for itself.

Mrs. FITZSTEPHEN O'SULLIVAN attended the Conference, and spoke on the question of aid from the Development Fund which the Board of Agriculture might be asked to dispense to assist exhibitors at Horticultural Shows in getting their produce to Exhibitions. She asked that this subject should be introduced to the notice of the Council, and asked further whether, from the same fund, provision might not be forthcoming for the establishment of centres of Horticultural training in the County of London.

The Conference closed with a hearty vote of thanks to the Chairman.

GENERAL MEETING.

OCTOBER 7, 1913.

Mr. T. W. SAUNDERS in the Chair.

Fellows elected (41).—Capt. F. Alston, B. F. Baines, Mrs. E. Boardman, W. McK. Bradley, Miss H. Crawford, Mrs. C. A. Denyer, K. Edgcumbe, Sir Steyning Edgerley, W. J. Empson, Miss V. G. Fraser, Mrs. C. H. Garton, Maj.-Gen. Sir Charles F. Hadden, K.C.B., H. T.

Harwood, D. O. Haworth, Miss A. Holmes, Miss E. L. Hughes, Brig.-Gen. H. K. Jackson, Dr. N. W. Jenkin, Mrs. E. S. Jenkins, Mrs. G. G. Hope Johnstone, Miss M. L. Keable, Rev. E. E. Kelly, Mrs. Lang, Mrs. Mead, J. A. Mertens, E. Niemeyer, Sir Sydney Olivier, K.C.M.G., Hon. Eleanor Pakington, Viscountess Parker, Mrs. Warren Peacocke, Mrs. Garnham Roper, H. Simpson, C. T. Strangways, Mrs. B. E. Strauss, A. P. Thom, Mrs. O. Gray Thompson, Rev. C. W. Wakefield, B. J. Webster-Greive, T. B. Coombe-Williams, J. E. Willison, The Bishop of Winchester.

Fellow resident abroad (1).—Dr. R. H. Makgill (Auckland, N.Z.).

Associates (2).—Mrs. S. Brice, Miss L. M. O. Van Gyseghem.

Society affiliated (1).—Wharncliffe, Silkstone, and District Horticultural Society.

A lecture on "The History and Development of the Strawberry" was given by Mr. E. A. Bunyard (see p. 541).

GENERAL MEETING.

October 21, 1913.

Mr. Bernard W. Crisp in the Chair.

Fellows elected (39).—Mr. Agar, Essex Allen, Mrs. Astell, W. R. Axtens, P. A. Bullen, Mrs. Cox-Cox, Mrs. Davidson, H. Dawkes, D. T. Edwards, Mrs. Fisher, Matthew Hyde, Mrs. Bower Ismay, E. L. James, F.C.S., A. Preston Jones, F. C. Knight, C. F. Langdon, J. C. Lawrence, A. McGrigor, Mrs. Morrell, Mrs. R. G. Norton, J. Peech, F. H. Please, Mrs. Raphael, H. Sharman, J. W. Shaw, Mrs. Mercer Smith, Mrs. Prince-Smith, Robert Smith, Mrs. J. F. C. Snell, E. Stobart, Mrs. W. R. Stobart, L. J. M. Studholme, Miss I. G. Templeton, Mrs. C. E. Turner, Walter J. Weir, J. Westwood, Miss G. Wild, Miss E. Willoughby, Mrs. Yapp.

Fellows resident abroad (3).—Hans Kayser (Germany), Sirdar D. Singh of Vahali (India), Arthur A. White (N.Z.).

Associates (2).—Miss A. M. G. Barber, Osborn Beal.

Societies affiliated (2).—North of Scotland Horticultural and Arborical Association, Port Elizabeth Y.M.C.A.

A lecture on "The Evolution of Plants, and the Directivity of Life, as shown by the Reproductive Organs" was given by the Rev. Prof. G. Henslow, M.A., V.M.H. (see p. 553).

DEPUTATION TO KENT COMMERCIAL FRUIT SHOW.

October 28, 1913.

A Deputation from the Society, consisting of Messrs. C. G. A. Nix, A. H. Pearson, V.M.H., James Hudson, V.M.H., and W. Poupart, visited the Kent Commercial Fruit Show held at Maidstone. The great feature of the Show was that it was truly commercial. Prizes

were offered for (1) Varieties of Apples which have a proved merit as market varieties, *i.e.* which crop and which sell; and (2) for the best packing and setting up of the fruit ready for sale.

Every exhibit was obliged to be staged in boxes or barrels, and the boxes were all of standard size.

The Apples selected were 'Bramley's,' 'Newton Wonder,' 'Prince Albert,' 'Blenheim,' 'Lord Derby,' 'Worcester,' 'Allington,' and 'Cox's Orange.'

In the class for 'Bramley's' there were 40 exhibitors, a magnificent show of itself. All the fruit was fine, and much of it magnificent, both in size and colour. 'Newtons,' 26 exhibits, many of them brilliant in colour. 'Prince Albert,' 28 exhibits, very fine. 'Blenheim,' 19 entries, with magnificent colour. 'Lord Derby,' 27, most of them of great size. 'Worcester,' 13 entries, very fine for so late in the season. 'Allington,' 26; most of the fruits were much too large for eating, unless they were cut up like a Melon and handed round in slices. 'Cox's,' 18 entries, all good, most of them excellent, though we have seen better samples in more favourable seasons.

A class for other cooking varieties brought out some grand boxes of 'Annie Elizabeth,' and good examples of 'Mère de Ménage,' 'Bismarck,' 'Dumelow,' 'The Queen,' and 'Gascoyne's Scarlet.'

Undoubtedly the champion exhibitors were Messrs. Gaskain & Whiting, whose exhibits at the R.H.S. Shows are familiar to all, and Mr. A. Miskin was a good second.

In the Trade Exhibits Messrs. G. Bunyard and Messrs. W. Seabrook made very fine displays, the first-named showing even better than at the R.H.S. Autumn Show, when their Apples were hardly up in colour.

List of Awards made by the Deputation.

Gold Medal.

To Messrs. Gaskain & Whiting, for collective exhibits of Apples.

Silver-gilt Knightian Medal.

To Messrs. Bunyard, for a collection of Apples and Pears.

To Mr. A. Miskin, for collective exhibits of Apples, and for packing of Apples in barrels especially.

Silver-gilt Banksian Medal.

To Messrs. W. Seabrook, for a collection of Apples.

Silver Knightian Medal.

To Mr. S. Skelton, for the best six boxes of Apples—'Bramley's Seedling.'

To Messrs. S. Spooner, for twenty-five Maiden Apple Trees in five varieties on crab stocks.

Silver Banksian Medal.

To Messrs. W. Ray, for twenty-five Maiden Apple Trees in five varieties on crab stocks.

To Mr. H. Cobb, for three boxes of 'Allington Pippin.'
To Mr. G. E. Champion, for three boxes of 'Bramley's Seedling.'
To Mr. F. Smith, for six boxes of 'Newton Wonder.'
To Mr. S. Smith, for Apples packed in barrels.
To Messrs. W. Skinner, for six boxes of 'Blenheim Orange Pippin.'

Bronze Knightian Medal.

To Mr. S. Smith, for three boxes of 'Worcester Pearmain.'
To Mr. D. Langlands, for three boxes of 'Mère de Ménage.'

GENERAL MEETING.

November 4, 1913.

Mr. Joseph Cheal, V.M.H., in the Chair.

Fellows elected (48).—Jervois Aarons, M.D., A. W. Alder, Miss Margaret Bertram, Samuel T. Bonner, A. G. Bourne, Miss B. C. Buchanan, Vere Caldwell, Mrs. R. Crawshay, P. A. Cul'ing, Harry A. Day, John Edge, Mrs. W. D. Filliter, Mrs. J. S. Findlay, Mrs. W. Finlay, Mrs. Murray Guthrie, Mrs. Habillon, Lady Hall, Mrs. Nigel Hanbury, Ernest Harrod, Lola Lady Hay, Frank Hickson, Geoffrey Hill, Miss I. A. M. Hill, Miss F. Hunt Holley, Miss Mary D. Holt, Alfred E. Howard, Miss E. M. Innes, Miss C. A. Ker, Mrs. Henry Laming, W. E. Lindley, Miss E. L. Lister, Bernard Lockwood, Mrs. St. Clair MacLeay, Prof. L. C. Miall, F.R.S., Mrs. G. C. Oliver, Mrs. George Punnett, Robert Roberts, Edward C. Rundle, Mrs. E. D. Russell, C. H. Sippe, J. Fox Tallis, Ambrose Teeling, Hugh W. Theobald, Edward L. Tomlin, D.L., J.P., Hon. Mrs. Wilkinson, David Wynter, Fred J. Young, Maxwell Young.

Fellow resident abroad (1).—J. van Zonneveld (Sassenheim).

Associates (2).—A. H. Chapman, William Passey.

Societies affiliated (3).—Normanby Horticultural Society (N.Z.), Old Swinford Horticultural Society, Walsall Floral and Horticultural Society.

A lecture on "The Principles of Garden Design" was given by Mr. Edward White (see p. 559).

GENERAL MEETING.

November 18, 1913.

Sir Harry J. Veitch, F.L.S., V.M.H., in the Chair.

Fellows elected (27).—Mrs. Fred Allhusen, Lady Barry, Mrs. R. Beech, Mrs. R. Browne, N. G. Burch, Mrs. A. Cappel, F. C. Clarke, Sir Reginald A. Cooper, Bart., M.P., Mrs. C. Crawshay, E. H. Tennyson d'Eyncourt, T. C. Dennes, Miss R. E. Flavelle, H. Francis, Clarence

R. Halse, Mrs. G. P. Huntley, E. Jenkins, R. B. Johnson, M.A., J.P., Mrs. A. MacSweeny, J. Horton Newton, J. E. R. Oldfield, Mrs. G. L. Stewart, F. H. Sully, P. R. Tremewen, Mrs. E. F. Waterhouse, Mrs. H. S. Waugh, Mrs. A. B. Webb, Lady Yule.

Fellow resident abroad (1).—N. C. Neogy (Calcutta).

Society affiliated (1).—Caerphilly Allotment Holders and Gardeners' Association.

GENERAL MEETING.

December 2, 1913.

Mr. W. A. Bilney, J.P., in the Chair.

Fellows elected (32).—Miss C. M. Aglionby, Miss K. J. Bailey, W. S. S. Baines, Capt. T. D. Butler, C.V.O., Walter Butt, T. W. Carnie, G. Blake Caulfield, Humphrey J. Denham, W. F. Eagland, E. G. Evans, Miss S. E. Going, Mrs. Grant, Miss M. Green, W. Brice Gregson, Miss M. Hewitt, Mrs. R. Howell, Mrs. Hutchinson, Mrs. Andrew Kingsmill, Mrs. A. Liebmann, Miss Beatrice Malcolm, Lady Mark, Mrs. W. J. Morgan, H. Nieberg, E. W. Pain, Mrs. C. C. Pratt, E. W. Reeves, Miss D. Reynolds, Miss C. M. Rivington, A. Tillie, Mrs. A. Tillie, Mrs. J. W. Weston, Mrs. Wethered.

Fellows resident abroad (5).—Col. W. C. Barratt, C.B., D.S.O. (Jersey), J. Gibbons (Burma), R. Gopal, M.A. (India), Capt. O. C. J. Hallum (Switzerland), Mrs. O. C. J. Hallum (Switzerland).

A lecture on "Principles of Garden Design" was given by Mr. E. A. White (see p. 570).

GENERAL MEETING.

December 16, 1913.

Mr. J. Gurney Fowler in the Chair.

Fellows elected (57).—F. W. Ashby, Mrs. A. W. Bayliss, Miss M. A. Bean, J. A. Beresford, C. Blackett, Mrs. W. Blackwell, Lieut.-Col. G. S. Burder, Miss B. Chaplin, Mrs. R. O. de Montmorency, J. Donaldson, H. N. P. Dugmore, A. P. Eccles, T. J. Edney, Mrs. E. G. Ewart, D. R. Falconer, Miss R. F. Faudel-Phillips, Mrs. A. Garrod, C. F. Gerrard, Miss J. Shirra Gibb, W. F. Goodwin, H. Whitworth Hall, Mrs. F. E. Hall, Mrs. G. Hamilton, Mrs. A. J. Harries, S. A. Hatherly, C. Heape, Mrs. W. H. Henderson, E. A. Hockney, Sir Charles Holroyd, A. E. Johnson, H. M. Kendal, S. M. Kirby, A. W. Lane, Miss B. H. Larkman, Sir William Lawrence, Bart., Mrs. F. W. Lund, Miss F. Maddick, Mrs. Micholls, Miss M. Milnes, Mrs. L. Monks, Miss P. Newton, The Lady Petre, Mrs. Ridsdale, Mrs. J. E. Rubie, Mrs. S. Sassoon, Rev. H. G. Stanley, J. Steedman, F. H. Sturdy, D. B. Thomas,

Mrs. P. C. Trench, The Hon. Mrs. Trollope, Mrs. F. Walker, Mrs. B. P. Wall, Miss N. L. Webb, J. B. B. Wellington, Miss G. H. Williams, C. Woods.

Fellows resident abroad (8).—Mrs. A. Boardman (U.S.A.), C. T. Hilton (British Columbia), J. A. Neame (New Zealand), A. H. Nehrling (U.S.A.), J. G. Thomson (B.C.), J. W. Tolmie (B.C.), L. J. Wicks (S. Aus.), T. Wilson (B.C.).

Associates (3).—L. Capitaine, Miss A. Graham-Barber, L. Marret.

Affiliated Societies (4).—Cannock and District Horticultural Society, Gidea Park Club Horticultural Society, Pontyclun and District Horticultural Society, Shedfield and District Horticultural Mutual Improvement Society.

THE CLARENCE ELLIOTT TROPHY FOR AN EXHIBIT OF ROCK GARDEN PLANTS.

WEDNESDAY, MAY 14.

Sir Everard Hambro, Hayes Place, Hayes, Kent (gr. J. Grandfield).

THE LAWRENCE MEDAL FOR 1913.

G. F. Moore, Esq., Bourton-on-the-Water, for Orchids.

SCIENTIFIC COMMITTEE.

SEPTEMBER 9, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and nine members present.

Adaglossum × *'Juno.'*—A Certificate of Appreciation to Messrs. McBean of Cooksbridge for work done in raising *Adaglossum* × 'Juno' (*Ada aurantiaca* × *Odontoglossum Edwardii*) was unanimously recommended. The plant is a remarkable cross between two very dissimilar genera of Oncideae, structurally very widely separated, the *Ada* having a simple raceme of orange-coloured flowers, with linear-lanceolate segments forming a tube at the base, and only expanding on the outer halves of the segments. *Odontoglossum Edwardii* is a strong grower producing branched spikes 3 feet in length, and with flatly displayed violet-purple segments. The form of the hybrid was nearest to *Ada*, but the segments of the flowers were broader and more openly displayed; the colour was bronze-purple with a yellowish lip which was twisted in some flowers.

Albino Wild Flowers.—Mr. Dipnall, of Hadleigh, Suffolk, sent an albino form of *Carduus nutans*, with some notes on colour variations, and added that he had recently discovered white forms of *Vicia lathyroides*, *Prunella vulgaris*, *Geranium lucidum*, and *G. dissectum*. These had occurred within a quite restricted area, and this suggested the possibility that soil had something to do with the variation. He had also found a bronzy-purple *Papaver Rhoeas*, pale pink *Centaurea nigra*, and clear pink *Myosotis palustris*.

Asters Failing.—Lady Howick sent Asters with decayed shoots. The committee recommended the splitting up of the old plants as the bases of stems sent were hard and had lost vitality.

Japanese Grasshoppers.—Mr. J. W. Odell showed for Mr. Goodacre, of Moulton Paddocks Gardens, a number of the Japanese grasshoppers (*Diestrammena marmorata*), and observed that the insects had established themselves in the large conservatory at Moulton, and had also invaded the mansion. The problem now was to exterminate them. They are large, handsome insects in the larval stage. When fully matured they will be very formidable-looking creatures.

Kefersteinia laminata.—*Kefersteinia* is a section of *Zygopetalum*, in the form of the flowers nearest to *Promenaea*, and in habit of growth (which is leafy, the pseudo-bulbs being rudimentary) to *Warscewiczella*. The species are chiefly Colombian, and there are some ten known species, of which *K. graminea* is the best known. *K. laminata* has white flowers with rose-coloured markings on the fringed lip. A specimen was shown by Messrs. Armstrong and Brown, and a Botanical Certificate was unanimously recommended to the plant.

Scientific Committee, September 23, 1913.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair, with seven members present, and Rev. J. Jacob, visitor.

Mites on Lime Tree.—Mr. A. D. Michael, F.L.S., reported that the mites on the Lime sent from Bristol to the last meeting were the Lime-tree form of the common *Tetranychus telarius*, sometimes separated under the name *T. tiliarum*, but really not distinct. It seems unpleasantly abundant and most destructive.

Narcissus bulbs diseased.—The bulbs sent by the Rev. J. Jacob were referred at the last meeting to Kew, and it is reported that the trouble, which consists of an internal rotting starting apparently from the base and proceeding gradually throughout the mass, "is due primarily to the fungus *Fusarium bulbigenum*, Cke. and Mass. Eelworms, mites, &c. are secondary. Numerous Narcissus bulbs attacked by this fungus have been received recently, and a detailed account is in preparation." Some discussion took place regarding the bulbs, which presented some curious features. There were strange outgrowths from the base presenting somewhat the appearance of roots covered with root hairs and about $\frac{3}{8}$ to $\frac{1}{2}$ an inch in length. Examination proved them to consist of masses of eelworms, some of which were active, and mixed with them a few eggs. Some varieties were attacked, while others growing side by side with them were immune. It was thought that the attack began while the bulbs were still in the ground, and was so little advanced when they were lifted that it was unnoticed then. There seemed no doubt from Mr. Jacob's description that the damage extended rapidly as the season of storage advanced.

Abnormal Gloxinias.—Mr. J. W. Odell reported that he had examined the abnormal Gloxinias sent to the last meeting by Mrs. Myles Kennedy, and found that the erect flower had four petaloid outgrowths originating from the base of the corolla and adnate for two-thirds of the length of the tube, terminating with a free apex. The outgrowths were similar in structure and colour to the corolla, and reversed as they are in some semi-double Primulas, the spotted surfaces of the outgrowths being turned to the inner surface of the corolla. The stamens corresponded in number and position to the outgrowths (two being suppressed), the filaments being adherent to the walls of the corolla and to the centre of the outgrowths. The anthers were basifixed at the apex of the outgrowths. In place of the normal six glands were five unequal structures, bifid, and thus resembling staminodes. The ovary was normal.

Mr. Odell showed other abnormal forms of Gloxinia for comparison (see p. ccxxiv.).

Aristolochia sempervirens fruiting.—Mr. Bowles showed, on behalf of Canon Ellacombe, some fruits of this *Aristolochia* from Bitton. There seems no previous record of its fruiting in this country.

Sempervivum arboreum.—Mr. Langworthy sent from his garden at Claygate an inflorescence of this Portuguese *Sempervivum*, with small leaf rosettes at the apex of each of the branches of the inflorescence, which had almost dried up.

Solanum crispum.—He also sent a section of a branch of *Solanum crispum*, measuring about $3\frac{1}{2}$ inches in diameter, cut from a plant growing outdoors at Claygate, Surrey

Crocus pulchellus fasciated.—Mr. E. A. Bowles showed *Crocus pulchellus* with two groups of perianth pieces, one containing six, the other seven parts, arising from the top of a common tube. The stamens were normal in number.

Primula vincaeflora.—A Botanical Certificate was unanimously recommended to this beautiful species, shown by Prof. I. Bayley Balfour from the Botanic Garden at Edinburgh. It was introduced by Forrest, who collected the seed in Yunnan. Its solitary, oblique flowers are $1\frac{1}{2}$ to 2 inches in diameter, of a rich purplish violet, and have the anterior stamens bent back, bringing the anthers near together. Three other species, of which *P. Elwesii* is in cultivation but has not yet flowered, share this character with *P. vincaeflora*, and form a unique and very beautiful group in this family. The seed from which the present plant was raised was collected in 1911.

Glassiness in Apples.—Specimens showing this peculiar appearance of semi-transparency were shown. The trouble, which is apparently of physiological origin, is very prevalent this year, and no cure is known.

Sweet Williams diseased.—Specimens badly attacked by *Puccinia arenariae* came from Liphook. This fungus attacks *Lychnis dioica* and several other wild plants, and no doubt spreads from these to cultivated Sweet Williams. The attacked plants should be burned, and the remainder sprayed with a rose-red solution of potassium permanganate

Fasciated Leontopodium.—Mr. J. Edwards, of Welshpool, sent a fasciated stem of *Leontopodium alpinum* from his garden.

Blue-flowered Potato.—Mr. W. Cuthbertson sent a flower of potato of a distinctly blue colour as opposed to the lilac or heliotrope tint commonly seen.

Scientific Committee, October 7, 1913.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair, with nine members present, and C. R. Scrase-Dickins, visitor.

Cycas revoluta.—Mr. E. M. Holmes, F.L.S., showed the ripe seed of *Cycas revoluta*. It had been grown and ripened in England.

Uncommon plants.— Mr. H. J. Elwes, F.R.S., showed a *Hippeastrum* with green flowers, which, it had been suggested, was a hybrid between *Hymenocallis* and a garden *Hippeastrum*, two genera which have

hitherto resisted efforts to cross them. It was, however, evidently *Hippeastrum calyptratum*, a species remarkable in the genus, not only for the curious growth which obstructs the throat of the perianth, but also from its evergreen habit.

Tricyrtis stolonifera, a plant which Mr. Elwes had found in bamboo jungles in Formosa, where it reaches a height of about 6 inches only, while in England it grows 4 feet tall in gardens, still maintaining its underground creeping habit.

Mr. Elwes also showed a Lily which he had found growing in Formosa, where it flowered in March, bearing up to as many as forty flowers. It strongly resembled some of the forms of *Lilium speciosum*.

Mr. A. C. Bartholomew, of Park House, Reading, sent a number of interesting flowers, including *Galanthus Olgae, Gentiana Kurroo, Aspilia buphthalmiflora, Solanum sisymbrifolium, Anchusa myosotidiflora, Malvastrum lateritium*, and others.

African Fruits, &c.—Mr. W. C. Worsdell, F.L.S., exhibited fruits of a species of *Eriodendron* with its silky cotton-covered seeds, Areca nuts, and a leaf of Mango from Zanzibar covered with scale insects, which he said was the usual condition there.

Pelargonium citriodorum.—Mr. J. Fraser, F.L.S., showed beautifully dried specimens of *Pelargonium citriodorum* and other forms from the Wisley collection, and commented upon the origin of these forms, mostly apparently from *P. crispum*. The results of Mr. Fraser's investigations will be published in the JOURNAL of the Society.

"Sporting" of Lilies.—Mr. C. R. Scrase-Dickins showed a most interesting series of specimens of *Lilium Sargentiae* grown in peat on the west coast of Ireland, much exposed to the wind. A bulb had last year (1912) produced a stem, the upper part of which carried the foliage of *L. Sargentiae*, the lower part foliage similar to that of *L. myriophyllum*. This plant was grown from a bulbil, not from seed. This season the stem from the same bulb had similar narrow leaves throughout its length, and the stem of the adjoining bulb in the row bore narrow leaves on the lower half and wider leaves above. This bulb had two offsets, of which the growth of one had the leaves all narrow and that of the other of the usual size. The flowers of the two stems (in one case four and in the other five) were quite normal. It would appear that this lily is changing the character of its leaves under the special conditions of its surroundings, and at the same time it is becoming dwarfer in stature, and the characteristic production of bulbils in the axis of the leaves seems to be disappearing. Will it approximate eventually to *Lilium myriophyllum*? It would seem that Mr. Scrase-Dickins had seen the passage of one species of Lily into another, or that the breadth of foliage which is constantly used as a distinguishing feature of these plants is a character of less importance than it is usually considered. Mr. Elwes drew attention to the remarkable variation to be seen between Lilies as one passes up the Formosan mountains, as though one species had produced forms adapted to the conditions under which they were growing, and

regarded by botanists who had seen only collected plants as specifically distinct. Other characters in plants which had been used by herbarium botanists as a basis of classification were frequently variations of adaptation as seen in the field.

Linaria hybrid.—Mr. Bowles showed a *Linaria* which had appeared in his garden, and was possibly a hybrid between *L. vulgaris* and *L. purpurea.*

Abnormal Gloxinias.—Mr. J. W. Odell sent the following note concerning the abnormal Gloxinias exhibited by him at the last meeting (p. ccxxi). "The series of flowers shown was selected to show the effect of peloria on other parts of the flower than the corolla. The flowers were all peloric, that is erect and regular, and in a batch of about fifty plants showed a large percentage of flowers with six sepals, a six-partite corolla, and six stamens of equal length with united anthers, thus differing in filaments and number from the typical didynamous type of Gesneraceæ.

"In a few flowers the stamens were in two groups, a four with united anthers, and a three with the same. Some flowers had five stamens of equal length with the anthers united and one odd one. The style appeared to be a very uncertain organ, the length varied, and several were considerably thickened."

Scientific Committee, October 21, 1913.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair, with six members present, and R. Farrer, visitor.

Pelargonium hybrids.—Mr. J. Fraser, F.L.S., continued his observations upon the origin of the garden varieties of scented-leaved Pelargoniums, dealing mainly with the varieties of *P. citriodorum* nearly allied to *P. crispum.* His full report will appear in the Journal of the Society.

Pears proliferous.—Mr. A. E. Bunyard sent a Pear, evidently from a summer flower, from the apex of which a stem proceeded bearing in its turn an apical fruit. Mr. Chittenden also showed somewhat similar fruits from Wisley, in one case bearing three buds at the distal end. Mr. Chittenden remarked that many but not all Pears produced from summer flowers, which were particularly numerous in the past season, were seedless, and showed examples in support of his statements. He had found, too, that the fruits borne when foreign pollen was prevented from reaching the stigmas were as a rule seedless, and in a few cases when the seeds had begun to form they had reached but a small size and were infertile. He showed fruits of the variety 'Conference,' and these, like 'Durondeau' and 'Hacon's Incomparable,' were seedless and had no developed core.

Phaseolus Caracalla.—Mr. Chittenden showed the flowers of this

curious East Indian plant, with their curled keels looking very like snails, so that the plant has been called the 'Snail flower.' The specimens came from Hampton Court, where the plant was introduced in 1690.

Lobelia hybrids.—Mr. J. S. Arkwright sent specimens of a hybrid between *Lobelia cardinalis* and *L. syphilitica*. The plants, which were tall, varied in the colours of their flowers and in the shades of their foliage. They gave promise of developing into handsome garden plants, though the colours were a little dingy at present. This may have been due in part at least to the late season of their flowering, and to the fact that they had been brought on in a greenhouse. The name *L.* × *Arkwrightii* was proposed for them.

Scientific Committee, November 4, 1913.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair, with ten members present, and Mr. R. W. Wallace, visitor.

Decaisnea Fargesii Fruiting.—Mr. R. W. Wallace exhibited fruits of *Decaisnea Fargesii* from a garden in the East of England. The curious Bean-like but fleshy fruits of this Berberidaceous plant are produced frequently in the West of England, but this is the first instance known to any member of the Committee of their ripening in the open in East Anglia.

Scented-leaved Pelargoniums.—Mr. J. Fraser, F.L.S., continued his observations on the history of these plants in gardens, illustrating his remarks as usual by means of beautifully dried specimens from the Wisley collection.

Quilled Chrysanthemums.—Mr. A. Worsley showed flowers of quilled Chrysanthemums from his garden. He said:—"I have never seen any record of the first appearance of these forms among garden Chrysanthemums, and perhaps we should have to search far back in the history of this genus before we should find the origin of these forms.

"At the present time it is probable that both forms exist *in posse* in the constitution of most of our garden Chrysanthemums, and will appear now and again in seedlings without any necessity for crossing the parent with pollen from quilled or 'anemone-flowered' varieties. I raised seedlings from the well-known 'Miss Mary Anderson' without artificial impregnation. At the time I grew no quilled or 'anemone-flowered' varieties, and the chances of insect fertilization were extremely remote. In the first place, no other greenhouses exist very near my garden, and secondly the season of the year is too late for bees or flies to be about. Furthermore, the seedlings resembled the parent in respect of colour, and differed only in the remarkable irregularity of the shape of the petals.

"Hence it appears almost certain that impregnation was effected

by the pollen of some other flower of the same variety ('Miss M. Anderson'). All the seedlings exhibited great irregularity in the flowers, they were all 'bad ones' from a florist's standpoint, most of them were quilled to some extent, and the plant of which I now exhibit flowers is, as you will see, both regularly quilled and truly 'anemone-flowered.'

"It is possible that the quilled form of Chrysanthemum was known in Japan at the time that the genus was first introduced into European gardens, but in the plate shown in the *Botanical Magazine* it is not clear if the artist intended to depict a truly quilled form, or if his 'quills' were meant to delineate petals not yet unrolled."

Mr. Shea remarked that Chrysanthemums rarely set seed without cross-pollination, and suggested that the pollen may have been brought by insects from a neighbouring garden. The earliest drawing of a Chrysanthemum was exhibited, and apparently showed traces of quilled flowers, so that the early-introduced plants no doubt brought this character with them.

Carnation-Chrysanthemum Graft.—A correspondent from Greenock sent Chrysanthemum flowers from plants which he claimed to have grafted on Carnation stocks, and said that the flowers varied from those of the plants from which the scions were taken. The Committee were unable to see whether the grafting had actually occurred or whether the scions had produced roots, and sought further information.

Organisms in an Orchid House.—Some curious seeds were referred to the Committee by the Orchid Committee, to whom they had been sent as insects which infested an Orchid house, without, however, any damage being traceable to them. They were the seeds of some plant, probably an *Oxalis*, which had been scattered by the plant over the house, and bore a distant resemblance to minute beetles, without legs.

Multiple Pear.—Mr. C. T. Druery, V.M.H., showed a multiple fruit of Pear formed from a summer flower in a garden at Acton. It appeared to consist of parts of four Pears in close contact, but was no doubt derived partly at least from the cortical tissues of the lower parts of the flower-stalk (see p. ccxxvi.).

Peloric Cattleya.—Mr. G. Wilson, F.L.S., showed a peloric form of *Cattleya labiata alba*, remarking that peloric forms of albinos were decidedly rare.

Iresine Sporting.—Mr. Longmire, of Clapham Common, showed a shoot of *Iresine acuminata*, in which the normal red foliage had been replaced on one side of the shoot by green leaves yellowish along the veins. The leaves and shoots were arranged so that alternate leaves on the one side of the stem were green, while the intervening leaves were half green and half red. The shoots in the axils of these leaves were green or half green and half red respectively. Shoots propagated from either side came true to these variations.

SCIENTIFIC COMMITTEE, NOVEMBER 18, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and nine members present.

Chrysanthemum-Carnation Graft.—The exhibitor of the flowers from this alleged graft now sent the plants from which they were taken, and careful examination of the lower part of the plant failed to reveal the least trace of grafting, while from the base of the stem from which the roots were derived a sucker was developing, clearly belonging to the Chrysanthemum. It seems evident that, unknown to the sender, the scion used had rooted and produced a Chrysanthemum plant, not perhaps exactly like the original plant, for sporting may occur, and frequently does, while colour varies in shade at least, according to the conditions under which it is produced

Pelargonium Sporting.—Mr. A. Worsley showed *Pelargonium* 'Firedragon' with a large flowered double sport from it.

Lycoris straminea, &c.—Mr. H. J. Elwes, F.R.S., showed a reputed hybrid *Lycoris* from a garden in Amoy, but which Mr. Worsley recog nized as *Lycoris straminea*, a not very well characterized species allied to *Lycoris aurea*. Mr. Elwes showed also a three-flowered *Cypripedium* hybrid, *C. concolor* × *C. superbiens* = *C.* × *Arnoldianum*.

Hybrid Pelargoniums.—Mr. J. Fraser, F.L.S., continued his remarks upon the history of *Pelargonium* hybrids, dealing with the forms of *P. Radula* and *P. denticulatum*.

Catasetum macrocarpum.—Mr. R. A. Rolfe, A.L.S., exhibited, from the collection of Mr. G. Rae Fraser, Letchmore Heath, Herts, an inflorescence of male flowers of *Catasetum macrocarpum*. Female flowers of the same plant have twice been shown before the Committee, in October 1910 and November 1911 respectively. In the interval the plant made two futile attempts to flower, but this year it has produced the male inflorescences shown, thus enabling the species to be identified with certainty. Both inflorescences are being preserved at Kew, and the plant is now being presented to the collection there, Mr. Fraser having another good plant.

Cypripedium insigne with three Lips.—Mr. Rolfe also exhibited from the collection of Mr. Albert Pam, Wormley Bury, Broxbourne, a twin-flowered scape of *Cypripedium insigne*, in which the upper flower was normal, but the lower had three lips, representing the condition of the well-known variety 'Oddity.' In this case the two lateral sepals were developed separately and diverge laterally, and the dorsal is reduced in breadth, while the petals are metamorphosed into lips, which clasp the normal lip.

SCIENTIFIC COMMITTEE, DECEMBER 2, 1913.

Mr. E. A. BOWLES in the Chair, and thirteen members present.

Potatos diseased.—Dr. A. J. Voelcker showed examples of Potatos with brown discoloration just beneath the skin, and a soft rot spreading therefrom into the tuber. The tubers had been grown at Woburn

and had been clamped, but not until after they had been some time in the clamp had the trouble become evident. Nothing had been seen of disease while the plants were growing. The tubers were sent to Wisley for further examination, along with others from Hampshire.

Pelargonium hybrids.—Mr. J. Fraser, F.L.S., showed further dried specimens from the Wisley collection, and made remarks on their origin from *Pelargonium denticulatum*, which appears to vary considerably in the foliage.

Seedlings from variegated plants.—Professor Bateson exhibited leaves of *Pelargonium* illustrating the two types of leaf-variegation, the mode of inheritance of which has been elucidated by Baur's classic investigations. In the *Pelargonium* the nature of the sub-epidermal layer —which layer gives rise to the germ-cells—determines the variegation or non-variegation of the leaves of the offspring. If the sub-epidermal layer contain chlorophyll, the offspring produced by self-fertilizing a variegated *Pelargonium* have normal green leaves; if, on the other hand, the sub-epidermal layer lack chlorophyll, the plant on self-fertilization gives rise to albino seedlings. Professor Bateson's experiments with variegated forms of *Chlorophytum elatum* and *C. comosum* have led to new and striking results. *Chlorophytum elatum* has leaves the margins of which are white and the central parts green. Self-fertilization of this type of variegated *Chlorophytum* results in the production of seedlings with normal green leaves. In *Chlorophytum comosum*, on the other hand, the variegation is reversed. A white stripe runs down the middle of the leaf and the margins are green. The few seedlings which have been obtained by self-fertilizing *C. comosum* of this form of variegation are all albinos. Some conversation took place with regard to the meaning of the phenomenon exhibited by the *Chlorophytum*. Other examples in which albino seedlings were produced were mentioned, and analogous cases of variegation were referred to. It would be interesting to cross the white-edged form of *C. elatum* with a form having a median white stripe to the leaf if such is at present in existence. One was known at one time under the name of *medio-pictum*, but appears to be rare if not extinct. The Committee would be glad to hear of its occurrence. It may be noted that the white-edged *Chlorophytum* has no chlorophyll-less sub-epidermal layer.

Evolution of the Winter-flowering Begonia.—Sir Harry Veitch showed a series of Winter-flowering Begonias to illustrate the evolution of these useful and beautiful plants from the original forms. *Begonia socotrana*, a species discovered in Socotra by Prof. I. Bayley Balfour, and brought to England by him under some difficulties owing to the Phylloxera orders in existence on the Continent, was crossed with one of the tuberous forms, which had been retarded for the purpose, by Mr. John Heal. *B. socotrana*, which was shown (fig. 198), flowers normally at this season, and it imparted this character to the seedling of the cross. The first of these was 'John Heal,' a very floriferous variety with rather small flowers. This was crossed again with tuberous forms, and

others raised, including ' Mrs. Heal,' and later double-flowered forms and plants with quite large flowers, and of a variety of shades, but none pure yellow or pure white so far. Along with the increase in size there was at first a drooping habit of florescence, but this was corrected by crossing back on to the original species, *B. socotrana*, which carries its flowers erect. *B. socotrana* does not appear to have handed on its peltate leaves to its offspring, but its persistent floral leaves are seen in the new forms, which retain their flowers for more than a month, until they fade without dropping. The Committee unanimously recommended a Certificate of Appreciation to Mr. John Heal for the remarkable and successful work he had accomplished in raising these decorative plants.

Leaf-cutting Bee.—Mr. Bowles showed the foliage of horse-chestnut with the well-known circular pieces removed by this insect. No member of the Committee had seen the leaves of this tree attacked in a similar way before.

Apples splitting.—Mr. W. Voss of Raleigh showed Apples which had split after they had been placed in the store. The Committee were of opinion that the late rains had so swollen the flesh of the Apple after the skin had become set that the latter could not long withstand the pressure set up. Mr. Voss also sent fruits of Apples ' Annie Elizabeth ' and ' Cox's Orange Pippin ' affected with bitter-pit.

Prunella vulgaris on a lawn.—A piece of lawn with this well-known weed was sent. It often occurs on lawns and spreads close to the ground when cut down by the mower. It is difficult to eradicate, but dressings at intervals with sulphate of ammonia at the rate of 1½ cwt. to the acre would probably kill the foliage of the weed and encourage the growth of the grass. Another method suggested was to forgo mowing for a time, and so permit the plant to grow tall enough to be removed by hand.

Growth on bulb.—A bulb was sent by Miss Skelton with a curious growth on its side, apparently due to the development of numerous adventitious buds.

SCIENTIFIC COMMITTEE, DECEMBER 16, 1913.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and two members present.

Growth on bulb.—Mr. W. C. Worsdell reported that the growth on the Scilla bulb shown at the last meeting was due to irritation set up probably by a mite, and was similar in its nature to that seen in the *Verbascum* he had shown at a previous meeting, though different in origin.

Potatos diseased.—Mr. Chittenden reported that the potatos sent by Dr. Voelcker from Woburn and by Mr. Odell from Hampshire were typical of a considerable number received at the Laboratory this season. Mr. Horne had made cultivations from them and found the

well-known fungus *Phytophthora infestans* growing in the diseased portions (usually just within the skin). Soft rot bacteria were present in some cases and *Fusarium* in many, but the initiation of the rotting was undoubtedly due to *Phytophthora*. *Phytophthora* was by no means abundant on the foliage of potatos during the past season, and in the former case it was definitely stated that no disease had been present on the tops of the plants during the growing season. The origin of the attack upon the tubers is therefore somewhat mysterious but by no means unprecedented, for the rotting of tubers stored while damp is very frequently brought about by this fungus. Inquiry showed that in the present cases the tubers had been exposed to damp weather conditions immediately prior to storing. In some instances the rotting had immediately followed upon the storing, having made noticeable progress within three or four days, although when put into the "pies" the tubers were apparently without damage.

Phalaenopsis Lindenii.—A Philippine *Phalaenopsis* was exhibited on December 2 by Messrs. Stuart Low, Jarvisbrook, which Mr. R. A. Rolfe reports is *Phalaenopsis Lindenii* Loher, a plant described in 1895 (*Journ. des Orch.* vi. p. 103). M. Loher, the original discoverer, remarked that it was somewhat like *P. Schilleriana* in the leaves and *P. rosea* in the flowers, but no other *Phalaenopsis* was found growing with it, so that it is uncertain whether it is a species or a natural hybrid. The record suggests that it might possibly be a form of *P. Veitchii*, but the flowers are not identical, the lip being simply apiculate at the apex, and without the small anchor-shaped tendrils of the latter. Messrs. Stuart Low believe that the plant came home with *Phalaenopsis Aphrodite*. Its history was given in the Orchid Review, xv. p. 296.

FRUIT AND VEGETABLE COMMITTEE.

SEPTEMBER 9, 1913.

Mr. W. POUPART in the Chair, and thirteen members present.

Awards Recommended:—

Gold Medal.

To Lady Nunburnholme (gr. Mr. F. Jordan), York, for fruit.
To C. F. Raphael, Esq. (gr. Mr. A. Grubb), Shenley, for fruit.

Silver-gilt Knightian Medal.

To Messrs. S. Low, Bush Hill Park, for Grapes and Figs.

Other Exhibits.

Messrs. H. Chapman, Rye: Tomato 'Autumn Dainty.'
Messrs. Laxton, Bedford: Apples.
Rev. W. MacGregor, Tamworth: Apples.
Mr. G. W. Miller, Wisbech: Apples.
Mr. J. T. Teldesley, Derby: Tomatos.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 23, 1913.

Mr. A. H. PEARSON, J.P., V.M.H., in the Chair, and eighteen members present.

Awards Recommended:—

Gold Medal.

To Messrs. Sutton, Reading, for vegetables.

Silver Knightian Medal.

To Messrs. Dickson & Robinson, Manchester, for Onions.
To Lieut.-Col. the Right Hon. Mark Lockwood, C.V.O. (gr. Mr. G. Cradduck), Romford, for Aubergines.

Silver Banksian Medal.

To the Church Army, London, for vegetables.
To Marquis of Ripon, Kingston-on-Thames, for Apples.

Bronze Knightian Medal.

To Mr. L. H. Potter, Old Malden, for Apples.

Cultural Commendation.

To Mr. G. Cradduck (gr. to Lieut.-Col. the Right Hon. Mark Lockwood, C.V.O.), Bishop's Hall, Romford, for Aubergines.

Other Exhibits.

Mr. A. R. Allan, Uxbridge: Tomato 'Duncan's Cropper.'
Messrs. Bunyard, Maidstone: Apple for naming.
Messrs. Dobbie, Edinburgh: Cabbage 'Mainstay.'
T. Glass, Esq., Sydenham: Grapes.
W. H. Myers, Esq., Bishops Waltham: Potatos.
Miss Nichol, Kensington: Australian Oranges.
Mr. W. Peters, Leatherhead: Potato 'Wm. Peters.'
Mr. W. Sands, Hillsborough: Potato 'Irish Gem.'
Mr. H. J. Towell, Ockham: Tomatos.
Messrs. J. Veitch, Chelsea: Apple 'St. Everard,' **F.C.C.** Sept. 28, 1909.
Messrs. R. Veitch, Exeter: Cabbage 'Early Jersey Wakefield.'
D. Vigo, Esq., Thaxted: fruit and vegetables.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 25, 1913.

BRITISH FRUIT SHOW.

Mr. A. H. PEARSON, J.P., V.M.H., in the Chair, and twenty-six members present.

Award Recommended:—

First-class Certificate.

To Damson 'Merryweather' (votes, unanimous), from Messrs. Merryweather, Southwell, Notts. A seedling Damson of great size and of a fine dark colour. The flavour is excellent, and its high quality is not diminished by cooking. The tree is a strong grower, with thick leathery foliage, and a free bearer. This variety received an Award of Merit October 29, 1907.

Other Exhibits.

Mr. W. Camm, Taplow: Seedling Apple.
Mr. W. R. Osborne, Leiston: Apples.
Mr. G. Pyne, Topsham: Apple 'Rev. W. Wilks,' **F.C.C.** Sept. 13, 1910.
Mr. A. Tidy, Cobham: Apples.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 7, 1913.

Mr. J. CHEAL in the Chair, and twelve members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To J. A. Nix, Esq. (gr. Mr. E. Neal), Crawley, for collection of fruit.

Silver Knightian Medal.

To Messrs. J. Veitch, Chelsea, for fruit trees in pots.

FIG. 198.—BEGONIA SOCOTRANA. (*Gardeners' Chronicle.*)
(p. ccxxviii.)

[*To face p.* ccxxxii.

Fig. 109.—Apple 'The Guelph.' (*Gardeners' Magazine.*) (p. ccxlix.)

Fig. 200.—Apple ‘ Cliveden Prolific.’ (p. ccxxxiii.)

FIG 201.—APPLE 'S. T. WRIGHT.' (p. ccxxxiii.)

[*To face p.* ccxxxiii.

Silver Banksian Medal.

To L. H. Potter, Esq., Old Malden, for Apples.

Bronze Knightian Medal.

To Purfleet Council School, Essex, for fruit.

First-class Certificate.

To Apple 'Guelph' (votes, unanimous), from Mr. W. Pope, Welford Gardens, Newbury. This excellent variety is the result of a cross between 'Charles Ross' and 'Rival.' The fruits are large, round, and finely coloured. Cavity shallow; calyx segments short; stalk deeply inserted. The colour is yellow, flushed with crimson on the sunny side. The fruit is excellent for dessert or cooking, and is in season in October. (Fig. 199.)

Award of Merit.

To Apple 'Cliveden Prolific' (votes, unanimous), from W. Astor, Esq. (gr. Mr. W. Camm), Cliveden, Taplow. Fruit of medium size and of slightly Pearmain shape. The colour is pale green, suffused with light scarlet on the sunny side. The tree is said to be a constant and a heavy cropper, and the fruit is in season for cooking purposes from Christmas till the end of April. (Fig. 200.)

To Apple 'Peacemaker' (votes, unanimous), from Mr. W. Pope, Welford Gardens, Newbury. An excellent cooking variety, obtained as the result of a cross between 'Houblon' and 'Rival.' The fruits are large and round, and have the calyx segments long and pointed. The colour is pale yellow, flushed with crimson. The tree is said to be a consistent and heavy bearer, and the fruit is in season throughout September.

To Apple 'S. T. Wright' (votes, unanimous), from Messrs. J. Veitch, Chelsea. A large culinary variety, resulting from a cross between 'Peasgood's Nonsuch' and 'Bismarck.' The colour is creamy-yellow, lightly striped with deep red, and the fruits are prominently ribbed. (Fig. 201.)

Other Exhibits.

Mrs. Baldwin, Cambridge: Apples.
Messrs. Cheal, Crawley: Apple 'Crawley Beauty.'
E. Molyneux, Esq., Bishop's Waltham: Apple 'Arthur Turner.'
Mr. R. Redden, Wallaton: Apple 'John West.'
Mr. J. Stevens, Willesden: Pear 'Brown Beauty.'
Mrs. E. Thurston, Romsey: Apple 'Awbridge Seedling.'

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 21, 1913.

Mr. J. CHEAL in the Chair, and seventeen members present.

Awards Recommended:—

Gold Medal.

To Messrs. Barr, Covent Garden, for vegetables.
To Messrs. Veitch, Chelsea, for Apples.

Silver-gilt Banksian Medal.

To Mrs. Gordon Canning (gr. Mr. H. Prentice), Maisemore, for fruit.

Silver Knightian Medal.

To Messrs. Cannell, Eynsford, for fruit.

Other Exhibits.

Mr. J. Brighton, Banbury: Apple 'Triumph.'
E. W. Caddick, Ross: Apple 'Caradoc Scarlet.'
Messrs. Chilvers, Hunstanton: seedling Apple.
Messrs. Kent & Brydon, Darlington: Brussels Sprouts.
Mr. G. R. King, Romford: Potato 'Aristocrat.'
Earl of Radnor, Salisbury: Melon.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 4, 1913.

Mr. J. CHEAL in the Chair, and thirteen members present.

Awards Recommended:—

Gold Medal.

To Messrs. Dobbie, Edinburgh, for Potatos.

Silver Knightian Medal.

To E. J. Johnstone, Esq. (gr. Mr. A. T. Paskett), Groombridge, for Apples.

To Duke of Rutland (gr. Mr. W. H. Divers, V.M.H.), Grantham, for Pears.

Silver Banksian Medal.

To Mrs. Miller, Marlow, for jams and jellies.
To Messrs. Seabrook, Chelmsford, for fruit.
To Miss Sewell, London, for jams and jellies.

Other Exhibits.

Messrs. Bath, Wisbech: seedling Apple.
Mr. H. Markham, Barnet: Apple 'Bloomfield.'
Mr. R. Roberts, Chadwell Heath: Apples.
Messrs. Westmacott, London: bottled fruit.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 18, 1913.

Mr. J. CHEAL in the Chair, and fifteen members present.

Award Recommended:—

Gold Medal.

To Messrs. Cheal, Crawley, for Apples.

Other Exhibits.

Messrs. Barrie & Brown, London: Apples.

Mr. W. Crump, Malvern: Apples 'Wm. Crump' and 'Madresfield Court.'

Mr. W. Hobby, Yeovil: Apple 'Hobby's Pearmain.'
Lt.-Col. Sir George Holford, Tetbury: Pear 'Bergamotte d'Esperen,' weighing 15 oz.
Horticultural College, Swanley: bottled fruit, &c.
Mary, Countess of Lovelace, Ockham: Autumn Raspberries.
Mr. W. Pope, Newbury: Apple 'Excelsior.'
Miss Sewell, London: jams, &c.
Mr. R. Staward, Hertford: Figs.
Messrs. Westmacott, London: jellies, &c.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 2, 1913.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended:—

Gold Hogg Medal.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree, for a collection of fruit.

Gold Medal.

To Messrs. Cannell, Eynsford, for a collection of fruit.
To the Government of British Columbia, for Apples.

Silver-gilt Knightian Medal.

To Right Hon. Lord North (gr. Mr. E. R. Janes), Banbury, for Onions.

Silver Banksian Medal.

To Messrs. Carter, Raynes Park, for Capsicums.

Cultural Commendation.

To Messrs. Barr, Covent Garden, for Kales.

Other Exhibits.

Mr. H. D. Bennett, Romford: Apple 'Bennett's Seedling.'
Miss K. M. Hall, Lingfield: Apple 'King George.'
Mr. T. Johnson, Shaftesbury: Scorzonera.
Miss Martin, London: marmalade.
Mrs. Miller, Marlow: jams, &c.
Mr. Watts, Kidlington: seedling Apple.
Messrs. Westmacott, London: bottled fruit.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 16, 1913.

Mr. W. BATES in the Chair, and one other member present.

There were no exhibits before the Committee on this occasion.

FLORAL COMMITTEE.

September 9, 1913.

Mr. H. B. May, V.M.H., in the Chair, and thirteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. J. Box, Hayward's Heath, for hardy plants.
To Messrs. Carter Page, London Wall, for Dahlias.

Silver-gilt Banksian Medal.

To Messrs. Dobbie, Edinburgh, for Dahlias.

Silver Flora Medal.

To Mr. L. R. Russell, Richmond, for Clematis &c.
To Messrs. Wells, Merstham, for Phloxes.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for miscellaneous flowering plants.
To Mr. C. Engelmann, Saffron Walden, for Carnations.
To Mr. A. Ll. Gwillim, Sidcup, for Begonias and hardy plants.
To Mr. J. MacDonald, Harpenden, for grasses.
To Messrs. May, Upper Edmonton, for Ferns &c.
To Mr. G. W. Miller, Wisbech, for hardy plants.
To Messrs. Ware, Feltham, for hardy plants.

Bronze Flora Medal.

To Messrs. Whitelegg & Page, Chislehurst, for hardy plants.

Bronze Banksian Medal.

To Guildford Hardy Plant Nursery, Guildford, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.
To Wargrave Plant Farm, Liverpool Street, E.C., for hardy plants.

Award of Merit.

To Antirrhinum No. 3, 'Amber Queen,' from Messrs. Barr, Covent Garden.

To Antirrhinum No. 4, 'Amber Queen,' from Messrs. Watkins & Simpson, Covent Garden.

To Antirrhinum No. 12, 'Beacon,' from Messrs. J. Veitch, Chelsea

To Antirrhinum No. 13, 'Beauty,' from Messrs. Barr, Covent Garden.

To Antirrhinum No. 17, 'Bonfire,' from Messrs. Simpson, Birmingham.

To Antirrhinum No. 18, 'Bonfire,' from Messrs. Sydenham, Birmingham.

To Antirrhinum No. 37, 'Carmine Queen,' from Messrs. Watkins & Simpson, Covent Garden.

To Antirrhinum No. 41, 'Coccinea,' from Messrs. Hurst, Houndsditch.

To Antirrhinum No. 56, 'Crimson King,' from Messrs. Hurst, Houndsditch.

To Antirrhinum No. 67, 'Daphne,' from Messrs. Hurst, Houndsditch.

To Antirrhinum No. 69, 'Defiance,' from Messrs. Bath, Wisbech.

To Antirrhinum No. 80, 'Fire King,' from Messrs. Bath, Wisbech.

To Antirrhinum No. 89, 'Golden Morn,' from Messrs. Watkins & Simpson, Covent Garden.

To Antirrhinum No. 90, 'Golden Queen,' from Messrs. Bath, Wisbech.

To Antirrhinum No. 104, 'Maize Queen,' from Messrs. Dobbie, Edinburgh.

To Antirrhinum No. 111, 'Moonlight,' from Messrs. Dobbie, Edinburgh.

To Antirrhinum No. 122, 'Pink,' from Messrs. J. Veitch, Chelsea.

To Antirrhinum No. 135, 'Queen Victoria,' from Messrs. J. Veitch, Chelsea.

To Antirrhinum No. 149, 'Rosy Morn,' from Messrs. Watkins & Simpson, Covent Garden.

To Antirrhinum No. 151, 'Salmon Pink,' from Messrs. R. Veitch, Exeter.

To Antirrhinum No. 164, 'Sunset,' from Messrs. Dickson & Robinson, Manchester.

To Antirrhinum No. 178, 'White Beauty,' from Messrs. Dobbie, Edinburgh.

To Antirrhinum No. 182, 'White Queen,' from Messrs. Dobbie, Edinburgh.

To Antirrhinum No. 185, 'Yellow,' from Messrs. J. Veitch, Chelsea.

To Antirrhinum No. 186, 'Yellow King,' from Messrs. Barr, Covent Garden.

To Antirrhinum No. 193, 'Yellow Queen,' from Messrs. Hurst, Houndsditch.

To Aster 'Feltham Blue' (votes, 6 for, 1 against), from Messrs. Ware, Feltham. A useful variety of the Novi-Belgii section. It is very free-flowering and graceful in habit, reaching 4 to 5 feet in height. The flowers are $1\frac{3}{4}$ inch across and the colour is a shade of ageratum blue. The stems are dark chocolate-brown in colour.

To Dahlia 'Inchmarnock' (votes, 6 for), from Messrs. Dobbie, Edinburgh. A very effective variety of the Collarette type. The flowers are $4\frac{1}{2}$ inches across, and are scarlet, with a yellow collar.

To *Salvia uliginosa* (votes, 7 for), from Mr. A. Turner, Slough. A very effective hardy perennial, growing about 4 feet tall. The

flowers are small, and measure ½ inch across. The colour is marine blue, while the lower lobe of the corolla has two small white streaks upon it. The outside of the tube is also white. The leaves are lanceolate and serrate.

Highly Commended.

Antirrhinum No. 1, 'Albino,' from Mr. Heinemann, Erfurt.

Antirrhinum No. 21, 'Brilliant,' from Messrs. Barr, Covent Garden.

Antirrhinum No. 24, 'Brilliant Rose,' from Messrs. Bath, Wisbech.

Antirrhinum No. 30, 'Buff Queen,' from Messrs. Watkins & Simpson, Covent Garden.

Antirrhinum No. 45, 'Coral Red,' from Messrs. J. Veitch, Chelsea.

Antirrhinum No. 58, 'Dainty,' from Messrs. Dickson & Robinson, Manchester.

Antirrhinum No. 63, 'Dainty Queen,' from Messrs. Sydenham, Birmingham.

Antirrhinum No. 82, 'Firelight,' from Messrs. Bath, Wisbech.

Antirrhinum No. 83, 'Galatea,' from Messrs. Barr, Covent Garden.

Antirrhinum No. 112, 'Nobile,' from Messrs. Hurst, Houndsditch.

Antirrhinum No. 126, 'Pink Beauty,' from Messrs. Watkins & Simpson, Covent Garden.

Antirrhinum No. 128, 'Pink Queen,' from Messrs. Watkins & Simpson Covent Garden.

Antirrhinum No. 145, 'Roseum,' from Messrs. Carter, Raynes Park.

Antirrhinum No. 156, 'Scarlet Carmine,' from Messrs. Dickson & Robinson, Manchester.

Antirrhinum No. 183, 'White Queen,' from Messrs. Hurst, Houndsditch.

Antirrhinum No. 189, 'Yellow Prince,' from Messrs. Hurst, Houndsditch.

All the above Antirrhinums were on trial at Wisley. For descriptions see report of Antirrhinum trial at Wisley.

Cultural Commendation.

To G. W. Tyser, Esq., J.P. (gr. Mr. S. W. Sherlock), Oakfield, Mortimer, for *Brunsvigia Josephinae*, **F.C.C.** August 13, 1895.

Other Exhibits.

Messrs. Allwood, Hayward's Heath: Carnations.

Messrs. H. Chapman, Rye: Nerine 'Rotherside.'

Messrs. Cheal, Crawley: Dahlias.

Messrs. Fairbairn, Carlisle: Delphinium 'Bridal Morn.'

Miss Lindsay, London: *Zephyranthes rosea.*

Messrs. S. Low, Bush Hill Park: Carnations.

Mr. W. Martin, Pinhoe: *Aster* 'Fair Maid' and *A.* 'Fair Helen.'

C. W. Morris, Esq., Taunton: Dahlia 'George May.'

Mr. A. Perry, Enfield: *Oenothera brachycarpa.*

Mr. W. Peters, Leatherhead: *Aster* 'Dorothy Sturgis.'
Messrs. Rich, Bath: hardy plants.
Mr. H. Shoesmith, Woking: Dahlias.
Mr. G. Thompson, Mitcham: Chrysanthemum 'Annie Thompson.'
Hon. E. Willoughby, Brompton R.S.O.; Carnations.
Mr. W. T. Woodhams, Burgess Hill: Pelargonium 'May Bravery.'

FLORAL COMMITTEE, SEPTEMBER 23, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Dobbie, Edinburgh, for Dahlias.

Silver Banksian Medal.

To Mr. E. Ballard, Colwall, for Asters.
To Messrs. Wells, Merstham, for Phloxes and Chrysanthemums.

Bronze Flora Medal.

To Mr. J. Box, Hayward's Heath, for Lilies &c.
To Messrs. S. Low, Bush Hill Park, for Carnations.
To Mr. J. B. Riding, Chingford, for Dahlias.
To Messrs. Treseder, Cardiff, for Dahlia Bouquets.
To Wargrave Plant Farm, London, for Asters.

Award of Merit.

To *Aster* 'Beauty of Ronsdorf' (votes, unanimous), from Messrs. Ware, Feltham. A charming dwarf variety of the Amellus section, growing 18 inches high. The flowers measure 2½ inches in diameter, and are violet-mauve in colour. The plant has a good habit, and should prove invaluable for the autumn border.

To *Aster* 'Mrs. Frank Penn' (votes, 12 for, 1 against), from Messrs. Jones, Lewisham. A very free-flowering and nicely branched variety, bearing rosy-mauve flowers measuring slightly over 1 inch across. The colour is very bright and a decided acquisition.

To *Berberis aggregata* (votes, 11 for), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree. A very pretty berried shrub of dwarf spreading habit, introduced from China by Mr. E. H. Wilson, V.M.H. The leaves are arranged in axillary rosettes, and are dull green above and lighter below, while the shape varies from ovate to oblanceolate. They measure about ½ inch long by ¼ inch broad. The small globular berries are borne in dense clusters, and are of a dull amber colour, suffused with coral.

To Carnation 'Fairmount' (votes, 14 for, 1 against), from Messrs. Allwood, Hayward's Heath. A very attractive Carnation, of excellent form and large size. The colour is light vinous mauve, and the variety

was considered by the Committee to be the best one of this colour yet introduced. It is an American seedling.

To Carnation 'Salmon King' (votes, 14 for, 4 against), from Messrs. S. Low, Bush Hill Park. Another excellent perpetual-flowering variety, of medium size. The flowers are full and neat, strongly scented, and have a good calyx. The colour is bright salmon-rose. (Fig. 202.)

To Chrysanthemum 'Olive' (votes, 9 for), from Messrs. Wells, Merstham. A very pretty early-flowering double variety. The colour is bright chestnut-red, while the reverse of the florets is bronze. The plants are about 2 to 2½ feet high, and flower very freely from the middle of September.

To Dahlia 'Dorothy Hawes' (votes, unanimous), from Messrs. Stredwick, St. Leonards. A very fine exhibition Cactus variety, with long, twisted petals, of a rosy magenta colour.

To Dahlia 'Herzogin von Braunschweig' (votes, 9 for), from Messrs. Warnaar & Co., Sassenheim. A large Pæony-flowered variety, having broad, rosy-orange petals. The flowers are supported on very strong, erect stems.

To Dahlia 'Homère' (votes, unanimous), from Messrs. Burrell, Cambridge. A very fine Cactus variety, having twisted florets of a deep crimson-maroon colour.

To Dahlia 'Mrs. J. C. Vaughan' (votes, 7 for, 3 against), from Messrs. Warnaar, Sassenheim. A bright primrose-yellow Pæony-flowered variety. The flowers are semi-double, with broad florets. The stems are very strong.

To Dahlia 'Reginald Cory' (votes, 6 for, 3 against), from Messrs. Cheal, Crawley. A good decorative Dahlia having two-thirds of each floret scarlet, and the tips white. The flowers are 3 inches in diameter, and are borne on good stalks.

To Dahlia 'Ruby' (votes, unanimous), from Messrs. Cheal, Crawley. A very good Pompon variety of medium size and nice form. The colour is rosy crimson.

To Dahlia 'Rupert' (votes, unanimous), from Mr. H. Shoesmith, Woking. A garden Cactus variety, measuring 7 to 8 inches across. The florets are deep yellow at the base and tips, and are of a pleasing shade of apricot for the remainder of their length. The combination of the colours is very attractive.

To *Primula vincaeflora* (votes, unanimous), from Professor Bayley Balfour, Edinburgh. A very remarkable species, collected by Forrest in 1905 in the Lichiang Mountains of Yunnan. The plant exhibited carried a solitary drooping flower, pale violet in colour and becoming deep violet at the centre. It was a little over 1½ inch in diameter, and very flat, with broad, full corolla lobes. The leaves, stem, and the tube of the corolla are covered with hairs. (See p. ccxxii.)

To Rose 'Moonlight' (votes, unanimous), from Rev. J. H. Pemberton, Havering, Essex. A charming semi-double Hybrid Tea Rose, raised by the exhibitor in 1909. The flowers are white, flushed lemon,

FIG. 202.—CARNATION 'SALMON KING.' (*Garden.*) (p. ccxl.)

[*To face p.* ccxl.

FIG. 203.—ROSE 'MOONLIGHT.' (p. ccxli.)

FIG. 204.—CARNATION 'GORGEOUS.' (*Lowe.*) (p. ccxlvi.)

FIG. 205.—IRIS VARTANI ALBA. (*Gardeners' Magazine.*) (p. cxlvii.)

[To face p. cxlvii.

and are borne in large trusses. The foliage is dark green, and the stems are purple. It is said to be perpetual-flowering in habit. (Fig. 203.)

NOTE.—The above awards to Dahlias were made by a Joint Committee of the National Dahlia Society and the R.H.S. Floral Committee.

Other Exhibits.

Messrs. H. Chapman, Rye : Nerines.
Messrs. Cutbush, Highgate : Pentstemons.
Mr. J. G. Davidson, Machany : variegated Antirrhinum.
Messrs. Hobbies, Dereham : Dahlias.
Messrs. Kidley, Wellington : *Gloriosa Carsonii.*
Messrs. Ladhams, Southampton : Pink 'Market Favourite.'
Mr. A. Perry, Enfield : Asters.
Messrs. Storrie & Storrie, Glencarse : Celosias.
Messrs. R. Veitch, Exeter : Nerines.
Messrs. Wallace, Colchester : *Armeria latifolia rosea.*

FLORAL COMMITTEE, OCTOBER 7, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended :—

Gold Medal.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree, for Chinese trees and shrubs.

Silver-gilt Flora Medal.

To Messrs. J. Veitch, Chelsea, for Bamboos, ornamental grasses, and Begonias.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for Asters and greenhouse plants.
To Messrs. Carter Page, London Wall, for Dahlias.

Silver Banksian Medal.

To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. Cheal, Crawley, for Dahlias and shrubs.
To Messrs. Dobbie, Edinburgh, for Dahlias.
To Messrs. Hill, Lower Edmonton, for Ferns.
To Messrs. Jackman, Woking, for Roses, &c.
To Messrs. Jones, Lewisham, for Asters and Chrysanthemums.
To Messrs. May, Upper Edmonton, for miscellaneous flowering plants.
To Messrs. Piper, Bayswater, for Dahlias and miniature Japanese gardens.

Bronze Flora Medal.

To Mr. E. Ballard, Colwall, for Asters.
To Mr. J. Box, Hayward's Heath, for hardy plants.
To Mr. S. Mortimer, Farnham, for Dahlias.
To Messrs. G. Paul, Cheshunt, for Roses and shrubs.
To Mr. J. B. Riding, Chingford, for Dahlias.
To Mr. L. R. Russell, Richmond, for Celosias.
To Wargrave Plant Farm, Liverpool Street, E.C., for Asters &c.
To Messrs. Wells, Merstham, for Chrysanthemums.

Bronze Banksian Medal.

To Messrs. Ware, Feltham, for Dahlias and Asters.

First-class Certificate.

To *Symphoricarpos racemosus laevigatus* (shown as *S. mollis*) (votes, 13 for, 2 against), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree. A very handsome species from China, bearing a remarkably heavy crop of large creamy-white berries. The leaves are ovate, dark green above and lighter below. The wood is brown, and the berries are borne in axillary clusters. Owing to the weight of the great crop of the latter, the plant exhibited had quite a pendulous habit.

Award of Merit.

To Carnation 'Queen Alexandra' (votes, unanimous), from Mr. G. Clarke, March, Cambs. This new perpetual-flowering variety originated as a sport from 'Scarlet Glow.' The flowers are of medium size and of excellent form. The calyx is non-bursting, and the colour is a lovely shade of salmon-pink. The plants exhibited appeared to be of good, strong constitution.

To Carnation 'Yellow Stone' (votes, 13 for), from Messrs. Allwood, Hayward's Heath. A perpetual-flowering variety, of American origin. The flowers are clear yellow, streaked with white. They are of nice form and possess good calyces.

To Dahlia 'Carl Bechstadt' (votes, 5 for), from Mr. J. B. Riding, Chingford. A good Collarette variety, measuring 4 inches across. The florets are broad, dark scarlet, with yellow at the base and tips. The florets composing the collar are pale yellow.

To Dahlia 'General de Sonis' (votes, 4 for, 2 against), from Mr. J. B. Riding, Chingford. A large Collarette Dahlia, measuring 5 inches in diameter. The florets are deep scarlet in colour, while the collar is yellow.

To Dahlia 'Offenbach' (votes, 7 for, 1 against), from Mr. J. B. Riding, Chingford. A very fine decorative variety. The flowers measure 6 inches across, and are very full and of nice shape. The colour is deep lemon-yellow, and the flower stems are very strong.

To Dahlia 'The Quaker' (votes, 6 for), from Messrs. Stredwick, St. Leonards-on-Sea. A fine exhibition Cactus variety, with long

pointed florets. The colour is white, suffused with mauve on the outer florets.

To *Nerine* 'Giantess' (votes, 15 for), from Messrs. Barr, Covent Garden. A very striking hybrid obtained as the result of a cross between *N. Bowdeni* ♀ and *N. coruscans major* ♂. The flowers are very large and of a deep rosy-carmine colour. They are borne in umbels of about fourteen on a tall, stout scape.

To *Nerine* 'Glory of Sarnia' (votes, 12 for, 3 against), from Messrs. Barr, Covent Garden. The flowers of this variety are of medium size and are borne in umbels of about twelve. The colour is scarlet. The cross from which this hybrid resulted was *N. coruscans major* ♀ × *N. Fothergillii major* ♂.

To *Nerine* 'Salmon Queen' (votes, 16 for), from H. J. Elwes, Esq., V.M.H., F.R.S. (gr. Mr. W. Walters), Colesborne, Cheltenham. A very beautiful reddish-salmon variety, of medium size. The flowers are borne in umbels of about twelve on a tall scape.

To *Paulownia tomentosa lanata* (votes, 7 for, 1 against), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree. A very handsome shrub or small tree, bearing large, irregular, entire leaves measuring as much as 1 foot across. They are covered with a fine dense tomentum, and are dark green above and light green below.

To *Tithonia* (*Helianthus*) *speciosa* (votes, unanimous), from Mr. W. Batchelor, Stoke Bruern Park, Towcester. Although introduced from Mexico in 1833, this attractive half-hardy annual appears to be little known at the present time. The peduncles are one-headed and thickened just below the flower. The ray florets, which number about twelve or thirteen, are fiery red, with orange cadmium reverse. The leaves are petiolate, cordate, undivided or crenately three-lobed. The plant is said to be 4 or 5 feet high, and the blooms measure 3½ inches across.

To *Tricyrtis stolonifera* (votes, 11 for, 1 against), from H. J. Elwes, Esq., V.M.H., F.R.S. (gr. Mr. W. Walters), Colesborne, Cheltenham. A very interesting species from Formosa. The flowers measure 1½ inch across, and are bluish lilac in colour (shade 4, 'Répertoire de Couleurs'); spotted with dark vinous mauve (shade 4, 'Répertoire de Couleurs'). The three outer perianth segments, in common with the other members of the genus, have protuberances at their bases. The flowers are borne in great profusion on delicate chocolate-brown stems. The leaves are ovate and spotted.

NOTE.—The above awards to Dahlias were recommended by a Joint Committee of the R.H.S. and the National Dahlia Society.

Other Exhibits.

Messrs. Burrell, Cambridge: Dahlias.
Messrs. H. Cannell, Eynsford: Pelargoniums.
Mr. C. W. Chantler, St. Mary Cray: hardy plants.
Messrs. Clark, Dover: hardy plants.
Mr. A. H. Cole, Swanley: Dahlias.

Messrs. Gibson, Bedale: hardy plants.
Mr. A. Ll. Gwillim, Sidcup: hardy plants and Begonias.
W. F. Laurie, Esq., Ware: Dahlia 'Tremelbye.'
Messrs. S. Low, Bush Hill Park: Carnations.
Mr. W. A. Manda, St. Albans: Dahlias.
Mr. W. Peters, Leatherhead: Aster 'Joan Sturgis.'
Misses Price & Fyfe, Lee: Chrysanthemums.
Mr. G. Reuthe, Keston: hardy plants and Nerines.
Mr. H. Shoesmith, Woking: Dahlia 'Nora Hopkins.'
Messrs. Spooner, Woking: Rose 'Miss Dorothy Mocatta.'
Messrs. Thompson & Charman, Bushey: alpines.
Mr. J. T. West, Brentwood: Dahlias.
Messrs. Whitelegg & Page, Chislehurst: hardy plants.

FLORAL COMMITTEE, OCTOBER 21, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-seven members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Jones, Lewisham, for Chrysanthemums.
To Mr. L. R. Russell, Richmond, for Bamboos.

Silver Flora Medal.

To Messrs. Cheal, Crawley, for clipped trees &c.
To Messrs. Cutbush, Highgate, for greenhouse plants.
To Messrs. Dickson & Robinson, Manchester, for Asters and Chrysanthemums.
To Messrs. S. Low, Enfield, for Carnations.
To Messrs. Carter Page, London Wall, for Dahlias.
To Messrs. Veitch, Chelsea, for greenhouse plants.
To Messrs. Wells, Merstham, for Chrysanthemums.

Silver Banksian Medal.

To Messrs. Allwood, Hayward's Heath, for Carnations.
To Messrs. May, Upper Edmonton, for greenhouse plants.
To Messrs. Peed, West Norwood, for Chrysanthemums.
To Mr. G. Prince, Longworth, for Roses.
To Mr. J. B. Riding, Chingford, for Dahlias.
To Messrs. Ware, Feltham, for Dahlias &c.
To Wargrave Plant Farm, London, for Chrysanthemums.

Bronze Banksian Medal.

To Messrs. Barr, Taplow, for Lilies &c.
To Messrs. Godfrey, Exmouth, for Chrysanthemums.
To Messrs. Wills & Segar, London, for greenhouse plants.

Award of Merit.

To Carnation 'Cinderella' (votes, 12 for, 1 against), from Messrs. Fairbairn, Carlisle. A very striking variety, bearing very large flowers of good form, with broad petals. The colour is mauve, splashed with broad streaks of carmine. The blooms are slightly scented and have non-bursting calyces. The plant appears to be a strong grower.

To Chrysanthemum 'Amy Poulton' (votes, unanimous), from Mr. H. Poulton, Easneye Park, Ware. A very fine Japanese variety, measuring $7\frac{1}{2}$ inches across. The colour is lilac white (shade 2, 'Répertoire de Couleurs').

To Chrysanthemum 'Mrs. R. C. Pulling' (votes, unanimous), from Messrs. Jones, Lewisham. An excellent incurved Japanese variety, of great size and good substance. The blooms are deep yellow in colour, and measure 7 inches in diameter.

To Chrysanthemum 'William Vert' (votes, unanimous), from Messrs. Wells, Merstham. A very fine Japanese variety, measuring 8 inches across. The florets are deep chestnut-red in colour, with a buff reverse. The blooms are of good form and substance.

Other Exhibits.

J. S. Arkwright, Esq., Presteign: *Lobelia* × *Arkwrightii*.
Messrs. Cole, Swanley: Zonal Pelargoniums.
Mr. C. Elliott, Stevenage: alpines.
Mr. J. J. Kettle, Wimborne: Violets.
Mr. G. R. King, Romford: Carnations.
Mr. W. A. Manda, St. Albans: Dahlias.
Rev. J. H. Pemberton, Romford: Roses.
Mr. F. Pestifield, Swanley: Carnation 'White Prolific,' and Chrysanthemum 'Miss Ethel Kidd.'
Misses Price & Fyfe, Lee: Chrysanthemums.
Mr. E. W. Read, Chislehurst: Chrysanthemums.
Mr. G. Reuthe, Keston: hardy plants.
Mr. G. H. H. Wassell, Baughurst: Chrysanthemum 'Mrs. Don.'
Messrs. Whitelegg & Page, Chislehurst: rock plants.

FLORAL COMMITTEE, NOVEMBER 4, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and seventeen members present.

Awards Recommended:—

Gold Medal.

To Messrs. Jones, Lewisham, for Chrysanthemums.

Silver-gilt Flora Medal.

To Messrs. J. Veitch, Chelsea, for Begonias and Chrysanthemums.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for Begonias and Carnations.
To Misses Price & Fyfe, Lee, for Chrysanthemums.
To Mr. L. R. Russell, Richmond, for stove plants.
To Messrs. Ware, Feltham, for Dahlias and Alpines.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for autumn foliage and Dahlias.
To Messrs. May, Upper Edmonton, for miscellaneous flowering plants.

Bronze Flora Medal.

To Messrs. Whitelegg & Page, Chislehurst, for Chrysanthemums.

Bronze Banksian Medal.

To Messrs. Allwood, Hayward's Heath, for Carnations.
To Messrs. Low, Bush Hill Park, for Carnations.
To Messrs. Piper, Bayswater, for Dahlias.
To Mr. G. Prince, Longworth, for Roses.
To Mr. G. Reuthe, Keston, for hardy plants.
To Wargrave Plant Farm, London, for Alpines.

Award of Merit.

To Carnation 'Champion' (votes, 9 for, 2 against), from Messrs. Wells, Merstham. A very bright scarlet perpetual-flowering variety, of American origin. The slightly scented flowers are of medium size and good form, and the calyx is non-splitting. This is considered to be the best variety of its colour yet introduced.

To Carnation 'Gorgeous' (votes, unanimous), from Messrs. S. Low, Bush Hill Park. A very fine American perpetual-flowering Carnation, with broad petals. The large flowers are of excellent form and are borne on stout stems. The colour is a bright shade of cerise. (Fig. 204.)

To Chrysanthemum 'Daily Mail' (votes, 12 for, 1 against), from Messrs. Wells, Merstham. A very stiff, globular, incurved Japanese variety, of large size. The colour is pale yellow, and the blooms measure 8 inches across.

To Chrysanthemum 'Golden Mensa' (votes, 10 for), from Messrs. Wells, Merstham. An excellent single variety, having several rows of pale lemon-yellow florets of good substance. It is a sport from the well-known variety 'Mensa,' and is deeper in colour than 'Mrs. Loo Thompson,' which also had the same origin. The blooms measure 4 inches in diameter.

To Chrysanthemum 'Madame Theresa Morel' (votes, 8 for), from Messrs. Wells, Merstham. A Japanese variety, with broad florets. The blooms measure 7 inches across and are of a pale golden yellow colour, which deepens at the centre.

To Chrysanthemum 'Pink Pearl' (votes, unanimous), from Messrs. Jones, Lewisham. A charming decorative variety, of good form, 6 inches in diameter. The florets are broad and delicate rose-pink.

To *Iris Vartani* 'White Pearl' (votes, 12 for, from Messrs. Wallace, Colchester. A very beautiful dwarf Iris from Jerusalem. It flowers in November and December, and is the earliest of the bulbous Irises to bloom. The almond-scented flowers are white, and, while somewhat resembling those of *I. reticulata* in form, are very distinct, especially in the narrow claw of the fall, which expands into an oval blade. The four-sided leaves are each armed with a horny point. This variety is often imported under the name of *I. histrioides alba*. It comes true from seed. (Fig. 205.)

Other Exhibits.

Messrs. Barrie & Brown, London: miscellaneous plants.
Mr. W. Broomfield, Streatley: Chrysanthemums.
Mr. G. Carpenter, Byfleet: Chrysanthemums.
Mr. F. F. Davey, Maida Vale: Chrysanthemums.
Mr. C. Elliott, Stevenage: alpines.
Messrs. Fairbairn, Carlisle: Carnations.
Mr. C. Ford, Kettering: Chrysanthemums.
Messrs. Godfrey, Exmouth: Chrysanthemums.
F. Du Cane Godman, Esq., Horsham: *Kniphofia multiflora*.
Mr. Govier, Hayes: Chrysanthemum 'Harry Govier.'
Mr. R. T. Halliday, Greenock: Chrysanthemums.
L. F. Harrison, Esq., East Grinstead: Chrysanthemums.
Mr. L. Lawrence, Shoreham: Chrysanthemum 'W. Fawcett.'
Mr. S. Mortimer, Farnham: Stocks &c.
Mr. A. Nobbs, Maidstone: Chrysanthemum 'Lady Arthur Butler.'
Messrs. Reamsbottom, Geashill: Chrysanthemums.
Messrs. Thompson & Charman, Bushey: hardy plants.
Messrs. Wills & Segar, Kensington: Begonias &c.

FLORAL COMMITTEE, NOVEMBER 18, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-eight members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. J. Veitch, Chelsea, for Begonias and Chrysanthemums.
To Messrs. Wells, Merstham, for Chrysanthemums.

Silver-gilt Banksian Medal.

To Messrs. Jones, Lewisham, for Chrysanthemums.

Silver Flora Medal.

To Messrs. Clibran, Altrincham, for Begonias.
To Messrs. Cutbush, Highgate, for Begonias and Carnations.
To Mr. G. Prince, Longworth, for Roses.
To Mr. L. R. Russell, Richmond, for berried shrubs.

Silver Banksian Medal.

To Messrs. Allwood, Hayward's Heath, for Carnations.

To Miss Baird (gr. Mr. Irving), West Malvern, for Poinsettias and Chrysanthemums.

To Messrs. Cannell, Eynsford, for Pelargoniums.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

To Messrs. May, Upper Edmonton, for miscellaneous flowering plants.

To Marchioness of Ripon (gr. Mr. Smith), Kingston Hill, for Chrysanthemums.

To Sir Corbet Woodall, J.P (gr. Mr. Toms), Chislehurst, for Begonias.

Bronze Flora Medal.

To Messrs. Cole, Swanley, for Pelargoniums.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.

To Messrs. S. Low, Bush Hill Park, for Carnations and Roses.

To Messrs. Peed, Norwood, for Chrysanthemums.

To Messrs. Rasmussen & Crone, Wanstead, for Begonias.

Bronze Banksian Medal.

To Mary, Countess of Lovelace (gr. Mr. Towell), Ockham, for Gesnerias.

To Misses Price & Fyfe, Lee, for Chrysanthemums and Carnations.

To Mr. C. J. Simpson, Chelmsford, for Chrysanthemums.

First-class Certificate.

To *Columnea Oerstediana* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. Bain), Burford, Dorking. A very elegant pendulous plant, of shrubby habit, from Costa Rica, bearing numbers of beautiful russet-orange tubular flowers measuring $2\frac{3}{4}$ inches in length. The foliage is small and glossy, and somewhat resembles that of the Box. The plant has been grown in a cool house at Burford. (Fig. 206.)

Award of Merit.

To Begonia 'Syros' (votes, unanimous), from Messrs. J. Veitch, Chelsea. A very beautiful winter-flowering hybrid obtained as the result of a cross between a single copper tuberous variety and *B. socotrana*. The large flowers are borne very freely and measure $2\frac{1}{2}$ inches across. They are orange-salmon in colour, and are said to last on the plant for a longer period than is usual with this race of plants. The foliage is very distinct, being dark green, pointed and serrated. The plant is a fairly strong grower and is of dwarf habit.

To Chrysanthemum 'Mary Morris' (votes, 13 for, 4 against), from Mr. T. Stevenson, Addlestone. An excellent single variety, measuring 4 inches in diameter. The flowers are dull terra-cotta in colour, and are borne with wonderful freedom. The plant exhibited was about 3 feet tall and some of its sprays had not been disbudded in order that the natural character of the variety might be seen.

FIG. 206.—COLUMNEA OERSTEDIANA. (*Garden.*) (p. ccxlviii.)

⌊*To face p.* ccxlviii.

FIG. 207.—PRIMULA MALACOIDES PLENA. (*Garden.*)
(p. col.)

FIG. 208.—CATTLEYA PERCIVALIANA ALBA. (*Gardeners' Chronicle.*) (p. cclx.)

FIG. 209.—ODONTOGLOSSUM × 'CLEOPATRA.' (*Gardeners' Chronicle*.) (p. cclx.)

[*To face p.* ccxlix.

Other Exhibits.

Mr. J. Box, Hayward's Heath: hardy plants.

Mr. F. H. Chapman, Rye: Nerine 'Brocade.'

Mrs. Farnham, Witley: Tulip 'Proserpine' and Narcissus 'Trumpet Major.'

Messrs. Felton, Hanover Square: Chrysanthemum 'Isobel Felton.'

Mr. A. H. Hall, Middlewich: Chrysanthemum 'Mrs. France-Hayhurst.'

L. F. Harrison, Esq., East Grinstead: Chrysanthemums.

Misses Hopkins, Shepperton: hardy plants.

Mr. G. Packham, Uxbridge: Chrysanthemum 'Harefield White.'

Messrs. Piper, Bayswater: miniature Japanese gardens.

Mr. G. Reuthe, Keston: hardy plants.

Mr. R. Staward, Hertford: Chrysanthemums.

Mr. H. Streeter, Shirley: Chrysanthemum 'Mrs. M. A. Lock.'

Messrs. Ware, Feltham: alpines.

Wargrave Plant Farm, London: alpines.

Messrs. Whitelegg & Page, Chislehurst: Chrysanthemums.

Miss E. Willmott, F.L.S., Great Warley: *Primula capitata*, Warley var.

Messrs. Wills & Segar, Kensington: miscellaneous flowering plants.

FLORAL COMMITTEE, DECEMBER 2, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended:—

Gold Medal.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

Silver-gilt Flora Medal.

To Messrs. S. Low, Bush Hill Park, for Carnations.

To Messrs. May, Upper Edmonton, for Poinsettias and Begonias.

To Messrs. J. Veitch, Chelsea, for Begonias.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations and alpine shrubs.

To Lieut.-Col. the Right Hon. Mark Lockwood, C.V.O. (gr. Mr. G. Cradduck), Romford, for Chrysanthemums.

To C. F. Raphael, Esq. (gr. Mr. A. Grubb), Shenley, for Carnations.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. Wells, Merstham, for Chrysanthemums.

Silver Banksian Medal.

To Messrs. Sutton, Reading, for Primulas.

To Messrs. Wills & Segar, Kensington, for miscellaneous flowering lants.

To Messrs. Young, Cheltenham, for Carnations.

Bronze Flora Medal.

To Mr. W. Lawrenson, Yarm, for Carnations.

Bronze Banksian Medal.

To Misses Price & Fyfe, Lee, for Carnations and Chrysanthemums.

To Mr. L. R. Russell, Richmond, for hardy shrubs.

Award of Merit.

To Begonia 'Rosalind' (votes unanimous), from Messrs. J. Veitch, Chelsea. An excellent winter-flowering Begonia, obtained as the result of crossing a white tuberous variety with *B. socotrana*. The single flowers, which measure 3 inches across, are borne in large terminal trusses, and are of a bright cerise-pink colour, which is wonderfully effective under artificial light. The plants are about 12 to 18 inches high, very free-flowering, and have large, dark green leaves.

To Chrysanthemum 'Cardinal' (votes unanimous), from Messrs. J. Veitch, Chelsea. A dark crimson single variety of medium height and sturdy habit. The blooms measure $2\frac{3}{4}$ inches across, and have three or four rows of stiff florets which surround a prominent golden yellow disc.

To Chrysanthemum 'Commodore' (votes, 15 for, 6 against), from Mr. T. Stevenson, Woburn Place Gardens, Addlestone. A deep maroon-crimson single, with small yellow disc. The blooms measure $3\frac{1}{2}$ inches in diameter, and have five or six rows of florets.

To Chrysanthemum 'Maud Jefferies' (votes, 17 for), from Lt.-Col. the Rt. Hon. Mark Lockwood, C.V.O. (gr. Mr. G. Cradduck), Romford. A very late pure white decorative Japanese Chrysanthemum of medium size, with broad florets. It is an excellent variety for growing in small pots.

To *Primula malacoides plena* (votes, 23 for, 1 against), from Messrs. Bees, Liverpool. A very pleasing double form of this pretty greenhouse Primula. The colour of the flowers is bright lilac. (Fig. 207.)

To Violet 'Kaiser Wilhelm' (votes, 17 for, 3 against), from Mr. T. Johnson, Motcombe Gardens, Shaftesbury. A very fragrant single variety, measuring $1\frac{3}{4}$ inch across. The flowers are rounder and fuller than those of 'Princess of Wales.' The colour is bluish lilac, with a small white eye.

Other Exhibits.

Messrs. Allwood, Hayward's Heath: Carnations.

Messrs. Barr, Covent Garden: pygmy trees, &c.

Messrs. Barrie & Brown, London: miscellaneous plants.

Mr. H. Berry, Gloucester: Chrysanthemum 'H. Berry.'

Rev. H. Buckston, Derby: Cyclamen 'Victoria Buckston.'
Messrs. Cannell, Eynsford: Pelargoniums.
Mr. W. Christison, Mickleham: Pelargonium 'Mrs. Leonard Cunliffe.'
Messrs. Cole, Swanley: miscellaneous plants.
Mr. A. F. Dutton, Iver: Carnations.
Mr. C. Elliott, Stevenage: rock plants.
Messrs. Fairbairn, Carlisle: Carnation 'Countess of Lonsdale.'
Hon. Vicary Gibbs, Elstree: *Berberis subcaulialata.*
Mr. E. Heathcote, Williton: Violets.
Mr. J. Honour, Tring: Chrysanthemum 'Golden H. W. Thorpe.'
Misses Hopkins, Shepperton: hardy plants.
Mr. J. J. Kettle, Corfe Mullen: Violets.
Manor House Nurseries, Cardiff: Chrysanthemums.
Mr. S. Mortimer, Farnham: Stocks.
Mrs. Mullens, Long Cross: Begonias.
Messrs. Peed, Norwood: Chrysanthemum 'Daisy Greenfield.'
Mr. G. Reuthe, Keston: hardy plants.
Mr. T. Ward, Bishops Stortford: Chrysanthemums.
Messrs. Ware, Feltham: hardy plants.
Wargrave Plant Farm, London: alpines.
Messrs. Whitelegg & Page, Chislehurst: alpines.

FLORAL COMMITTEE, DECEMBER 16, 1913.

Mr. H. B. MAY, V.M.H., in the Chair, and sixteen members present.

Awards Recommended:

Award of Merit.

To Carnation 'Philadelphia' (votes, 15 for), from Messrs. Wells, Merstham. A good perpetual flowering variety bearing large full flowers having non-splitting calyces. The colour is cerise and the blooms have little or no perfume.

To Chrysanthemum 'Bertha Lachaux' (votes, 10 for, 2 against), from Messrs. Wells, Merstham. A decorative variety having large rose-pink blooms measuring 6 inches across.

Other Exhibits.

Messrs. S. Low, Bush Hill Park: Carnations.
Mr. E. Slater, Ruddington: Chrysanthemums.
Rev. H. G. Stanley, Cardiff: Pelargonium 'Mrs. A. P. Stanley.'

ORCHID COMMITTEE.

SEPTEMBER 9, 1913.

Mr. J. GURNEY FOWLER in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for showy hybrids.

Silver Flora Medal.

To Messrs. Charlesworth, Hayward's Heath, for a group.

Silver Banksian Medal.

To Messrs. Hassall, Southgate, for a group.

Award of Merit.

To *Laeliocattleya* × 'Geo. Woodhams' (*C. Hardyana* × *L. purpurata*) (votes, 13 for, 1 against), from Messrs. Armstrong & Brown, Tunbridge Wells. One of the finest of rose and purple, large-flowered hybrids.

To *Odontioda* × *Seymourae*, Orchidhurst var. (*Charlesworthii* × *Bradshawiae*) (votes, 14 for, 2 against), from Messrs. Armstrong & Brown. Flowers large, bright red, with yellow crest.

Cultural Commendation.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., K.C.V.O., for *Zygopetalum maxillare*, with seven spikes, and the variety *Sanderiana*, with six.

To Mr. G. B. Lees (gr. to E. de Q. Quincey, Esq.), for *Bulbophyllum Medusae*.

Other Exhibits.

R. G. Thwaites, Esq.: *Odontoglossum* × *Wilsonii* (*Vuylstekei* × *Rolfeae*).

E. H. Davidson, Esq.: rare hybrids.

Pantia Ralli, Esq.: *Laeliocattleya* × 'Anthela' (*L.-c.* × 'Phryne' × *C. Warscewiczii*).

Lieut.-Col. Sir Geo. L. Holford, K.C.V.O.: *Laeliocattleya* × 'Lustre.'

Francis Wellesley, Esq.: *Laeliocattleya* × 'Mrs. Donald MacMaster' (*L.-c.* × *luminosa* × *C. Dowiana aurea*).

H. T. Pitt, Esq.: a group.

Messrs. McBean: new hybrids.

ORCHID COMMITTEE, SEPTEMBER 23, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for Laelio-cattleyas, Cattleyas, &c.

To H. S. Goodson, Esq. (gr. Mr. G. E. Day), for a group.

To Messrs. Sander, St. Albans, for hybrids and rare species.

To Messrs. Charlesworth, for well-grown plants.

Silver Banksian Medal.

To R. G. Thwaites, Esq., Streatham, for *Cattleya* × 'Iris,' *C.* × 'Adula' &c.

To Messrs. Cypher, Cheltenham, for a group.

To Messrs. Hassall, Southgate, for *Cattleya Dowiana aurea*, *C.* × *Hardyana*, &c.

Award of Merit.

To *Laeliocattleya* × 'Armada' (*L.-c.* × *luminosa* × *C. fulvescens*) (votes, 14 for, 6 against), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O., Westonbirt (gr. Mr. H. G. Alexander). Sepals and petals cream-white, shaded with buff-yellow, and with light-purple veining on the petals. Lip broad, yellow, with broken lines of violet.

To *Cattleya* × 'Cybele' (*Luddemanniana* × *Gaskelliana alba*) (votes, 18 for, 1 against), from E. H. Davidson, Esq., Twyford. Flower of good shape, white, with a purple blotch on the lip.

Cultural Commendation.

To Messrs. Armstrong & Brown, Tunbridge Wells, for a fine plant of the rare *Oncidium corynephorum splendens*, with 34 flowers.

Other Exhibits.

E. H. Davidson, Esq.: hybrids of *Odontoglossum Rossii*, and Sophrocattleyas.

Walter Cobb, Esq.: *Cypripedium* × *villosum Rothschildianum.*

W. R. Lee, Esq.: *Cypripedium* × 'Niobe' *Leeanum.*

Mrs. Temple: *Cypripedium Ashburtonae* (42 flowers).

G. W. Bird, Esq.: *Cattleya* × 'Freya.'

Messrs. Sander: *Odontonia* × *MacNabiana* (*O. Edwardii* × *M. Bleuana*).

Messrs. Mansell & Hatcher: *Odontioda* × (*O.* × *ardentissimum* × *O. Charlesworthii*).

R. G. Thwaites, Esq.: *Laeliocattleya* × 'Neleus' (*C.* × 'Iris' × *L.-c.* × 'Ophir').

Orchid Committee, October 7, 1913.

Mr. J. Gurney Fowler in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Charlesworth, Hayward's Heath, for a group.

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for Laeliocattleyas, and other hybrids.

To Messrs. Sander, St. Albans, for hybrids and rare species.

Silver Banksian Medal.

To Messrs. Stuart Low, Bush Hill Park, for a group.

To Messrs. Hassall, Southgate, for hybrids.

First-class Certificate.

To *Cattleya* × 'Adula,' Glebe variety (*bicolor* × *Hardyana*) (votes unanimous), from C. J. Phillips, Esq., The Glebe, Sevenoaks. A broad-petalled flower of a rich bronzy-yellow colour, with large deep-crimson lip.

Award of Merit.

To *Odontoglossum* × *Crawshayanum superbum* (*Hallii* × *Harryanum*) (votes, 7 for, 3 against), from Pantia Ralli, Esq., Ashtead Park, Surrey. Flower formed like *O. Hallii*. Sepals and petals pale-green, blotched with chocolate-brown. Lip large, white, with purple spotting on the basal half.

To *Cattleya* × 'Fabia' var. 'Prince of Wales' (*labiata* × *Dowiana*) (votes unanimous), from Messrs. Sander, St. Albans. The best of the dark-coloured forms. Flowers bright magenta-rose, with purplish-crimson front to the lip.

Other Exhibits.

W. Waters Butler, Esq.: *Cattleya Hardyana albens* and *C.* × *Dietrichiana*.

H. S. Goodson, Esq.: *Cattleya* × 'Rhoda' *illuminata*.

R. G. Thwaites, Esq.: hybrid Cattleyas.

Pantia Ralli, Esq.: *Laeliocattleya* × 'Maqueda' (*L.-c.* × 'Geo. Woodhams' × *C.* × 'Lord Rothschild'), and other hybrids.

Sir John Edwards Moss: *Cymbidium* × 'Florinda' (*erythrostylum* × *giganteum*).

Messrs. McBean: a group.

Messrs. Flory & Black: new Brassolaeliocattleyas.

Mr. E. V. Low: *Cattleya* × 'Iris.'

E. H. Davidson, Esq.: hybrids.

ORCHID COMMITTEE, OCTOBER 21, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-five members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrids.

Silver Banksian Medal.

To W. R. Lee, Esq., for a group.

To Lieut.-Colonel Sir G. L. Holford, K.C.V.O. (gr. Mr. Alexander), for a group.

To Messrs. Jas. Cypher, Cheltenham, for a group.

To Messrs. Stuart Low, Bush Hill Park, for a group.

To Messrs. Hassall, Southgate, for Cattleyas and Laeliocattleyas.

To Messrs. Sander, St. Albans, for a group.

Award of Merit.

To *Oncidium varicosum*, Westonbirt variety (votes unanimous), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O. (gr. Mr. H. G. Alexander). Flowers very large, the bright yellow labellum broader than long. Sepals and petals yellow, with greenish markings.

To *Odontoglossum* × 'Vivien' (parentage unrecorded) (votes, 14 for, 4 against), from Lieut.-Colonel Sir Geo. L. Holford. Flowers resembling some of the best blotched *O. crispum*, white, with ruby-purple blotches on the segments.

To *Cypripedium* × 'Queen Alexandra' (parentage unrecorded) (votes, 14 for, 3 against), from W. R. Lee, Esq., Plumpton Hall, Heywood, Lancs. A large and finely formed hybrid, the broad white dorsal sepal dark-purple at the base; the massive petals and lip yellowish, tinged and veined with rose-purple. Staminode white, with green boss.

To *Cattleya* × 'Empress Frederick' var. 'Avia Clifton' (*Mossiae* × *Dowiana aurea*) (votes unanimous), from Pantia Ralli, Esq., Ashtead Park, Surrey. Flower white, with orange labellum, marked in the centre with reddish-purple.

To *Cattleya* × *graniris* (*granulosa* × 'Iris') (votes unanimous), from C. J. Phillips, Esq., Sevenoaks. Flowers intermediate in form and colour. Sepals and petals bronzy-orange, lip carmine-red.

To *Sophrolaeliocattleya* × 'Laconia' (*L.-c.* × *callistoglossa* × *S.-l.* × *heatonensis*) (votes unanimous), from Messrs. Charlesworth. A pretty dwarf hybrid, with reddish-rose flowers with dark-purple markings on the lip.

Other Exhibits.

Mrs. Bischoffsheim: *Cattleya labiata*, Warren House variety.

His Grace the Duke of Marlborough: hybrid (*Cypripedium Fairrieanum* × *C.* × 'Standard').

W. Bolton, Esq.: *Cattleya* × 'Surprise' (*Trianae* × *granulosa*).

H. T. Pitt, Esq.: hybrid Orchids.

H. S. Goodson, Esq.: Sophrolaeliocattleyas &c.

Sir Trevor Lawrence, Bart.: *Cattleya* × *Cooksoni* (*Hardyana* × *Trianae*).

C. J. Phillips, Esq.: *Laeliocattleya* × 'Hon. Mrs. Astor,' Glebe variety.

Francis Wellesley, Esq.: *Laeliocattleya* × 'Capt. Starkie' (*L.-c.* × 'Aphrodite' × *C. labiata*).

H. T. Pitt, Esq.: hybrids.

ORCHID COMMITTEE, NOVEMBER 4, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Charlesworth, Hayward's Heath, for a group of hybrid Cattleyas &c.

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrids and rare species.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for a group.

Silver Banksian Medal.

To Sir Jeremiah Colman, Bart., for Cattleyas.

To Messrs. Sander, St. Albans, for a group of Laeliocattleyas &c.

Bronze Banksian Medal.

To Messrs. J. Cypher, Cheltenham, for a group.

Award of Merit.

To *Odontoglossum crispum xanthotes*, Westonbirt variety (votes unanimous), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O., Westonbirt (gr. Mr. H. G. Alexander). Flower of good shape, pure white, with chrome-yellow blotches.

To *Cypripedium* × 'Olympus' ('Alcibiades' × *Leeanum Clinkaberryanum*) (votes unanimous), from Lieut.-Colonel Sir Geo. L. Holford. An improvement on the fine *C.* × 'Alcibiades.' Dorsal sepal 3½ inches across, white, with several purple lines from the small greenish base. Lip and petals yellow, tinged mahogany-red.

To *Laeliocattleya* × 'Olenus,' Blenheim variety (*L.-c.* × *bletchleyensis* × *C. Dowiana aurea*) (votes unanimous), from His Grace the Duke of Marlborough, Blenheim (gr. Mr. Hunter). Flowers large and broad-petalled, bright purplish-crimson, with dark ruby-red lip.

To *Cattleya* × *Drapsiana*, McBean's variety (*C. Dowiana aurea* × *C.* × 'Mrs. Pitt') (votes unanimous), from Messrs. McBean,

Cooksbridge. Flower bright yellow, with heavy surface-colouring of glowing rose-purple, the front of the lip marked with the same colour.

To *Sophrolaeliocattleya* × 'Niobe' (*L.-c.* × *Gottoiana* × *S.-l.* × 'Felicia') (votes unanimous), from Messrs. Charlesworth. Sepals and petals reddish-rose, lip crimson.

To *Cypripedium* × 'Estella' (*Godefroyae* × *Fairrieanum*) (votes, 14 for, 1 against), from Messrs. Sander. Flower cream-white, with dotted lines of purple, the petals decurved as in *C. Fairrieanum*.

Cultural Commendation.

To Mr. J. E. Shill (gr. to Baron Bruno Schröder), for a magnificent plant of *Odontoglossum* × *crispo-Harryanum*, The Dell variety, with a spike of fourteen large and handsomely blotched flowers.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., K.C.V.O., for a large specimen of *Coelogyne fimbriata*, with many flowers.

To Mr. W. H. White, for *Sigmatostalix radicans*, with many spikes.

Other Exhibits.

Sir Jeremiah Colman, Bart., showed the blue-tinted *Cattleya* × 'Portia' *coerulea*, and other Cattleyas.

Lieut.-Colonel Sir Geo. L. Holford showed new hybrids.

E. H. Davidson, Esq., sent *Odontioda* × 'Gladys' (*Odontoglossum Rossii rubescens* × *Odontioda* × *Bradshawiae*).

Messrs. Flory & Black: hybrids.

F. Du Cane Godman, Esq.: *Cattleya* × *Mantinii*.

W. R. Lee, Esq.: *Odontoglossum crispum xanthotes*.

Pantia Ralli, Esq.: *Odontoglossum* × *ashteadense*.

C. J. Phillips, Esq.: two hybrids.

W. Waters Butler, Esq.: forms of *Cattleya labiata*.

ORCHID COMMITTEE, NOVEMBER 18, 1913.

Mr. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for hybrid Calanthes, and other Orchids.

To Messrs. Charlesworth, Hayward's Heath, for a group.

Silver Banksian Medal.

To Messrs. Flory & Black, Slough, for hybrids

To Messrs. Jas. Cypher, Cheltenham, for Cypripediums.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for a group.

To Messrs. Hassall, Southgate, for Cattleyas and Laeliocattleyas.

To Messrs. W. Baylor Hartland, Cork, for a group.

Award of Merit.

To *Cypripedium* × 'Cyclops' ('Actaeus' × *fulshawense*) (votes unanimous), from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O., Westonbirt (gr. Mr. H. G. Alexander). Flower very large and finely formed. Petals and lip greenish-yellow tinged with purple. Dorsal sepal white, with a green base and dotted lines of purple.

To *Angraecum recurvum* (votes unanimous), from Messrs. Charlesworth. A remarkable species from Madagascar, of strong growth, and producing the flowers singly on peduncles 6 inches long. Flowers 2 inches across, segments nearly equal, pure white, fragrant. Spur long and slender. Figured in *Thouars' Orch. Af.* t. 56.

To *Laeliocattleya* × 'Feronia' *Charlesworth* var. (*C.* × 'Enid' × *L.-c.* × *Haroldiana*) (votes, 12 for, 4 against), from Messrs. Charlesworth. A fine flower, closely adhering to *C.* × 'Enid' in form. Sepals and petals silver-white, tinged and veined with rose. Lip purple, with gold lines from the base.

To *Miltonioda* × *Harwoodii*, Shrubbery var. (*M. vexillaria* var. × *C. Noezliana*) (votes, 13 for, 3 against), from Messrs. Armstrong & Brown, Tunbridge Wells. Flowers of good shape, bright magenta-red with yellow crest to the lip.

To *Cypripedium* × 'Baron Schröder' var. 'Kentore' (*Oenanthum superbum* × *Fairrieanum*) (votes unanimous), from Messrs. Armstrong & Brown. One of the best of the *C. Fairrieanum* hybrids. Petals and lip heavily marked with chocolate-purple. Dorsal sepal blush white with dark-purple dotted lines from the green base.

To *Dendrobium Leeanum*, Langley variety (votes, 14 for, 5 against), from Messrs. Flory & Black, Slough. Imported with *D. Phalaenopsis* and *D. superbiens*, between which species it is a natural hybrid. Flowers dark-rose colour, with claret-purple lip.

Cultural Commendation.

To Mr. H. G. Alexander, Orchid grower to Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O., for *Cattleya* × 'Portia,' Westonbirt variety, with three spikes of seven flowers each.

Other Exhibits.

Sir Trevor Lawrence, Bart., K.C.V.O.: *Brassolaeliocattleya* × 'Triune' (*L.-c.* × *Hyeana* × *B.-c.* × *Digbyano-Schröderi*).

Mrs. Norman Cookson: Odontiodas.

O. O. Wrigley, Esq.: *Vanda coerulea Wrigleyi.*

Ernest Mocatta, Esq.: rare orchids.

Messrs. Sander: hybrids.

Francis Wellesley, Esq.: *Laeliocattleya* × 'Lady Oliphant' (*L.-c.* × 'Norba' × *C.* × 'Souv. de Queen Victoria').

E. H. Davidson, Esq.: hybrids.

C. J. Lucas, Esq.: white *Brassocattleya.*

Orchid Committee, December 2, 1913.

Mr. J. Gurney Fowler in the Chair, and twenty members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Flory & Black, Slough, for hybrids.
To Messrs. Sander, St. Albans, for hybrids and rare species.
To Messrs. J. Cypher, Cheltenham, for Cypripediums.
To Messrs. Stuart Low, Enfield, for a group.

Silver Banksian Medal.

To Messrs. Hassall, Southgate, for hybrid Cattleyas.
To Mr. H. Dixon, Spencer Park, Wandsworth, for a group.

First Class Certificate.

To *Cattleya* × 'Maggie Raphael,' The Dell variety (*Trianae alba* × *Dowiana aurea*) (votes, 14 for, 2 against), from Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill). A large flower, with pure-white sepals and petals and rose-crimson lip with gold lines in the tube. The spike bore four flowers.

Award of Merit.

To *Cypripedium* × 'Goliath' (*insigne* 'Harefield Hall' × 'Amy Moore') (votes, 10 for, 5 against), from W. R. Lee, Esq., Plumpton Hall, Heywood. Resembling *C. insigne* 'Harefield Hall,' but larger and with dark-purple spotting in the dorsal sepal.

To *Cypripedium* × 'Alcinida' var. 'Strelsa' (*insigne* 'Harefield Hall' × 'Alcibiades') (votes, 10 for, 5 against), from W. R. Lee, Esq. A good flower of perfect shape. Dorsal sepal pale green in the lower half, white above, spotted with reddish purple. Petals and lip greenish tinged with purple. Shown as *C.* × 'Strelsa.'

To *Odontioda* × 'Latona,' Goodson's variety (*Odontoglossum* × *crispo-Harryanum* × *Odontioda* × *Bradshawiae*) (votes, 15 for, 4 against). Flowers scarlet, with slight white lines across the segments.

To *Laeliocattleya* × *autodoin* (*L. autumnalis* × *C.* × 'Octave Doin') (votes, 12 for, 3 against), from Messrs. McBean, Cooksbridge. Spike tall, and flowers formed like *L. autumnalis*, but twice the size ; light rose.

To *Laeliocattleya* × 'Mrs. Temple' (*L.-c.* × 'Henry Greenwood' × *C. Mossiae*) (votes unanimous), from C. J. Phillips, Esq., Sevenoaks, Flowers large, rose-colour, with purple mottling on the front of the lip. Shown as *L.-c.* × 'Dreadnought.'

To *Odontoglossum* × 'Saturne' *violaceum* (*nebulosum* × *crispo-Harryanum*) (votes, 15 for, 2 against), from Monsieur H. Graire, Amiens. Habit of *O. nebulosum* ; scape five-flowered, blush-white, with dense spotting of red.

Cultural Commendation.

To Mr. H. G. Alexander, Orchid grower to Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O., for a fine plant of *Laeliocattleya* × 'Golden Beauty,' with two spikes, each of fifteen flowers and buds.

Other Exhibits.

Baron Bruno Schröder: rare Cattleyas.
Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O.: hybrids.
Sir Trevor Lawrence, Bart., K.C.V.O.: *Angraecum Monteiroe.*
W. R. Lee, Esq.: Cypripediums.
Francis Wellesley, Esq.: *Cypripedium* × 'Delhi.'
Messrs. Charlesworth: a group.
Messrs. McBean: a group.
Mr. E. V. Low: *Cypripedium* × *I'Ansoni.*
W. Hewett, Esq., Bristol: *Cypripedium* hyb.
Crofton Black, Esq., Upminster: *Odontoglossum grande.*

ORCHID COMMITTEE, DECEMBER 16, 1913.

Mr. J. GURNEY FOWLER in the Chair, and nineteen members present.

Awards Recommended :—

First Class Certificate.

To *Cattleya Percivaliana alba*, Lady Holford (votes unanimous) from Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O., Westonbirt, Tetbury (gr. Mr. H. G. Alexander). One of the most beautiful of albino Cattleyas. Flowers pure white, with deep orange tube to the lip. The finely-grown plant bore four flowers. (Fig. 208.)

Award of Merit.

To *Odontonia* × *Langowoyi* (*M. Schroderiana* × *O. Uro-Skinneri*) (votes unanimous), from Messrs. Charlesworth, Hayward's Heath. Flowers nearest to *Miltonia.* Scape erect, bearing ten blooms, each about 2 inches across. Sepals and broader petals lanceolate; dark chocolate-red, with yellow tips. Lip expanded in front, white, with a rose-purple base.

To *Odontoglossum* × 'Cleopatra,' Rosefield var. ('Carmania' × *Vuylstekei*) (votes unanimous), from de B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables). Sepals and petals light reddish-purple. Lip white, with purple blotches in front of the yellow crest. (Fig. 209.)

To *Cypripedium* × *nitens-Leeanum smaragdinum* (*nitens Sallieri Hyeanum* × *Leeanum giganteum*) (votes, 10 for, 5 against), from F. J. Hanbury, Esq., Brockhurst, East Grinstead (gr. Mr. Matthews). Flower emerald-green, with white upper-half to the dorsal sepal.

To *Cypripedium* × *bourtonense* (*insigne* 'Harefield Hall' × 'Blanche Moore') (votes unanimous), from G. F. Moore, Esq. Bourton-on-the-Water (gr. Mr. Page). A large flower, with much of

the *C. insigne* character; the upper half of the dorsal sepal and margins of the broad lower sepals being white.

Other Exhibits.

Baron Bruno Schröder: *Odontoglossum ardentissimum* 'Ebor.'
Sir Trevor Lawrence, Bart., K.C.V.O.: *Habenaria Roebelenii.*
Earl Stanhope: hybrid Calanthes.
Lieut.-Colonel Sir Geo. L. Holford, K.C.V.O.: Cypripediums.
E. R. Ashton, Esq.: *Odontioda* 'Royal Gem.'
Messrs. Armstrong & Brown: *Cypripedium* 'Sandhurst' (*concolor Regnieri* × *Fairrieanum*).
Messrs. Charlesworth: rare Orchids.
Messrs. McBean: Odontiodas &c.
F. M. Ogilvie, Esq.: Cypripediums.

RECOGNITION OF CHILDREN'S WORK IN PLANT LIFE.

The Certificate of "Recognition of Diligent Interest in Plants," established by the Council to be bestowed upon children as an encouragement to work carefully and interestedly in plant life, has been sent to each of the following during 1913:—

Aug. 19th. Rodney Rundle, for the best kept School Garden Plot, Pensilva; Head Master, Mr. O. A. Sargent.
Nov. 4th. Laura E. Davidge, of Australia, for Drawings of Plants.
,, 6th. Bertha Billiness, for Cultivation of Chrysanthemums, Eastbourne Horticultural Society.
,, 6th. Alfred Clements, for Cultivation of Chrysanthemums, Eastbourne Horticultural Society.

HORTICULTURAL SUNDRIES.

Awards made in 1913.*

Sprayers and Syringes.

Award of Merit.

† 1. Abol Knapsack Sprayer with patent nozzle and bend from Messrs. E. A. White, Paddock Wood. Container copper; brass pump (left hand) and air chamber outside; capacity 3½ galls. Pump easy working; nozzles giving a fine spray.

2. Knapsack Spraying Machine, 'Éclair No. 1,' from Messrs. Cooper, Pegler, Christopher Street, London, E.C. Container copper, capacity 3½ galls. One Vermorel self-cleaning nozzle with three caps, coarse, medium, and fine; very good sprays; leather washer to lid. Pump and air-chamber inside, and therefore not quite so accessible as others. Rubber washers to valves.

3. No. 5. Abol Patent Syringe from Messrs. E. A. White, Paddock Wood. Barrel brass, 1 inch by 20 inches, bend solid; brass ball valve; packing cotton waste; washers leather; no strainer; caps, coarse, medium, and fine; fine spray very fine; no clogging after use; drip protector reaching up one-third of barrel. The Committee thought the provision of space for carrying spare caps &c. would improve the outfit.

4. Spraying Machine, 'Éclair Étamé,' from Messrs. Cooper, Pegler, Christopher Street, London, E.C. Tinned copper; capacity 3½ galls., with agitator, otherwise exactly as 'Éclair No. 1' mentioned above.

5. The Demon Continuous Spray Syringe from the Boundary Chemical Co., 27 Cranmer Street, Liverpool. Double action brass pump; bend detachable and reversible; plunger leather; tube 1 inch, but barrel 2 inches diameter; brass ball valves; strainer at end of 6 ft. rubber hose which dips into bucket; easily cleaned and renewed; spray maker pushes out for cleaning; spray mist-like, continuous; no clogging after use.

6. Undentable Syringe No. 9 from The Four Oaks Spraying Machine Co., Sutton Coldfield, near Birmingham. Barrel brass, corrugated (undentable), 1 inch by 20 inches. Angle bend hinged (not included in award); three nozzles, straight, fine, and mist spray; brass ball valve; cotton waste packing; leather washers; no strainer; no clogging after use; outside diameter about 2 inches. Rose spray included.

* These awards stand for ten years only and lapse in 1923.
† The order of entry is purely accidental and has no reference to merit.

Highly Commended.

7. 'Battle' Spraying and Lime-washing Machine from The Four Oaks Spraying Machine Co., Sutton Coldfield, near Birmingham. A machine for spraying in large plantations; wood container 18 or 25 galls. capacity; brass pumps; on iron carriage with large and wide-tyred wheels. Pump easily removable. Leather plunger and washers; brass ball valves easily accessible. Strainer on pump large and not detachable. Strainer also in top of tub. Weight when charged about 300 lb. Easy to wheel and stands rigid; well balanced; width over all 23 inches. Two 15-feet delivery pipes of rubber hose; two bamboo brass-lined lances with side entry tube; taps on lances. Three nozzles, coarse, medium, and mistifier (excellent); no clogging. The nozzles, probably the best in the trial, were also Highly Commended.

8. Four Oaks Nozzles for spraying machines. See No. 7.

9. Double Charge Pump from Messrs. H. Hartjen, 35 Noble Street, London, E.C. This machine consists of an air and a fluid pump, fixed to a large reservoir capable of holding 30 galls. of spray fluid. It is used for charging pneumatic knapsack machines first with air and then with spray fluid. The latter compresses the air already in the machine to a high pressure capable of discharging the fluid in a very finely divided spray. One minute is taken to charge with air, and the same time to charge with fluid. One air charge is sufficient for a day, and many knapsack machines might be charged under the inspection of a reliable man.

10. Hand Diffuser from The Alpha Co., Ross. A pneumatic machine of 6 pints capacity; steel lead-lined; tap on brass delivery tube; one jet giving a fine spray; can be charged with air by means of ordinary bicycle pump.

11. Knapsack Sprayer with overhead pump-handle, 'New Combination' pattern, from The Four Oaks Spraying Machine Co., Sutton Coldfield, near Birmingham. Container copper with detachable tinned lining; weight 14lb. when empty; capacity 3½ galls.; three nozzles and hose supplied. Pump brass, detachable, central and carried inside container; handle worked overhead, detachable. Sprayer provided with foot, and could be fitted with handle for use as bucket sprayer. Agitator easily worked; all parts accessible; conical strainer in top; leather washers; brass ball valves; two leather washers to plunger. The machine might be improved in convenience by the provision of a waist-belt.

Commended.

12. 'Holder' Hand Sprayer, Type D, from Messrs. H. Hartjen, 35 Noble Street, London, E.C. Made in copper or steel; capacity 4 pints; brass pump contained; nozzles of Drake & Fletcher type; lever release tap.

13. Knapsack Sprayer from Messrs. Benton & Stone, Bracebridge Street, Birmingham. Container copper; brass pump and air-chamber

outside; valves, screw down caps with brass ball and spring. Weight when empty 14 lb., capacity 3½ galls., washers leather; plunger brass, hemp packed; left-hand handle to pump. 'Utility' two-way nozzle cleansed by automatic spring. Agitator working up and down with pump handle, but apparently stiff.

14. No. 2 Arnold Syringe from Messrs. Purser, Palmer Street, Birmingham, and Messrs. Corry, Covent Garden, W.C. Barrel brass, 1 inch by 20 inches. No bend but automatic reverse, which often failed, and needs improvement. Brass ball valve; packing cotton; washers leather; no strainer; coarse, medium, and fine sprays, the last especially fine; no clogging after six charges of lime water; drip protector provided.

15. Pneumatic Sprayer No. 1807 from Messrs. Benton & Stone, Bracebridge Street, Birmingham. Container copper, holding 6 pints; pump brass, contained; strainer behind nozzle. Nozzle with screw-in (hand) spray maker; tap handle.

16. The Vermorel Hand Sprayer from Messrs. Cooper, Pegler, Christopher Street, London, E.C. Container copper; capacity 4 pints, washers rubber; plunger leather; pump contained; press-down lever handle.

17. 'Utility' Sprayer from Messrs. Benton & Stone, Bracebridge Street, Birmingham. Tank galvanized inside; painted outside; carried on iron carriage; capacity 40 galls. Pump brass with lead washers. One foot plunger, cotton packed; brass ball valves. Three inlet valves, one large suction valve; two delivery tubes with 4-way cock, allowing any one or both, or neither sprayer to be used. Cocks on lances; agitator with cleaning brushes, adjustable and easily renewed. Agitator small, but fairly efficient. Utility 2-way nozzle cleansed by automatic spring; 'Seneca' nozzle reversible for cleaning. Pump easily detachable. Two lengths rubber hose, two lances and nozzles included.

Insecticides.

Award of Merit.

1. Bentley's Nicotine Soap Insecticide from Messrs. Bentley, Barrow-on-Humber, near Hull. This preparation was found to be excellent for destroying aphis.

Highly Commended.

2. Bentley's Compound Liquid Quassia Extract from Messrs. Bentley, Barrow-on-Humber, near Hull. An excellent preparation for destroying aphis.

3. Naptho Nicotyl from Messrs. Voss, Glengall Road, Millwall, E. A soil fumigant and insecticide which was found to be excellent for wireworm and insects in the soil. When tried on Carrots and other crops the results were highly satisfactory.

Commended.

4. Clift's Fluid Insecticide from Messrs. Robinson, West Bromwich, Staffs. This preparation was found to be deadly to worms, and apparently caused no injury to the foliage or roots of Saxifrages and other rock plants which grew upon the treated area.

Weed-Killers.

Highly Commended.

1. Watson's Lawn Sand from Messrs. A. J. Barbour, 8 Upper Fountaine Street, Leeds. A useful preparation, which destroyed all moss and flat-leaved weeds and improved the grass.

Commended.

2. Acme Weed Killer from The Acme Chemical Co., Vale Road East, Tonbridge, Kent. This is supplied in liquid or powder form, and was found to do its work well.

3. Bentley's Double Strength Weed Destroyer from Messrs. Bentley, Barrow-on-Humber, near Hull. Very effectual in destroying all weeds, moss, &c. on walks and drives.

4. Cooper's Weedicide from Messrs. Cooper & Nephews, Berkhamsted. This proved very good for killing all weeds and moss on walks.

5. Watson's Weed Killer from Messrs. Barbour, 8 Upper Fountaine Street, Leeds. A very good preparation for killing all weeds and moss on paths.

Garden Implements and Appliances.

Award of Merit.

1. Lawn Edge Clipper from Messrs. Barford & Perkins, Queen Street Iron Works, Peterborough. A simple and well-made implement for cutting lawn edges. It does its work very rapidly and well.

2. Motor Cultivator, small size, from Mr. C. W. Polito, 85 Gracechurch Street, London, E.C. An excellent cultivator for plantations and large gardens. It is propelled and operated by a Bauché 2½ horse-power petrol engine, and is fitted with five hoes, which give an efficient tillage over a span of 2 feet 6 inches and to a depth of 2½ inches. The engine consumes about one quart of petrol an hour, in which time the machine is capable of travelling about 3,000 yards. The frame is constructed of hardened steel and the wheels are of French cast steel. They are 14 inches in diameter and have tyres 5 inches wide.

3. Mower, The 'Godiva' Bowling Green, from Messrs. Barford & Perkins, Peterborough. An excellent close-cutting 16-inch machine, admirably adapted for mowing bowling and putting greens.

4. Mower, The 'Godiva' Lawn, from Messrs. Barford & Perkins, Peterborough. A good 12-inch machine for ordinary mowing.

5. Mower, The 'Silens Messor' Standard Pattern, from Messrs.

Green, Southwark Street, London, S.E. A good 12-inch machine for ordinary mowing.

6. Mower, The 'Silens Messor,' fitted with special bottom blade, from Messrs. Green, Southwark Street, London, S.E. The bottom blade fitted to this 12-inch machine enables it to cut grass particularly short, as would be required for bowling or putting greens.

Highly Commended.

7. Bulb Dibber from Messrs. Barr, 11 King Street, Covent Garden, London, W.C. A useful implement for planting bulbs in borders. It consists of a strong wooden T-shaped handle tipped with iron. Two small iron projections are fitted to the upper part of the iron tip so that the implement may be pushed into the ground with the foot.

8. Bulb Planter from Messrs. Barr, Covent Garden, London, W.C. A capital implement for planting bulbs in grass. On being pressed into the soil with the aid of the foot and withdrawn, it lifts a piece of turf and several inches of soil, leaving a hole into which the bulb is dropped. The soil and turf can then be replaced.

9. Garden Hose Reels, 'Through Water-way,' from Messrs. Headley & Edwards, Corn Exchange Street, Cambridge. These were thought to be very good and practical. The user is able to water with a part or all the hose on the reel or out at full length.

10. Greenhouse, 'Board's Patent Wire Tension,' from Messrs. Skinner, Board & Co., Rupert Works, Bristol. Of good design, simple, practical, and economical.

11. Lawn Cleaner, 'Pennsylvania,' from Messrs. Lloyd Lawrence, 29 Worship Street, London, E.C. A first-rate machine for cleaning lawns of sticks, leaves, &c., whether lying thickly or thinly on the ground.

12. Motor Cultivator, large size, from Mr. C. W. Polito, 85 Gracechurch Street, London, E.C. A useful cultivator for large plantations, propelled and worked by a 4½-h.p. Bauché petrol engine, which consumes half a gallon of spirit an hour. The machine is capable of travelling about 3000 yards an hour, and is fitted with four 5-inch hoes, which give an efficient tillage span of 3 feet 8 inches to a depth of 4 inches. The frame is of hardened steel.

13. Motor Roller from Messrs. Barford & Perkins, Peterborough. A light motor roller, size A3, having a rolling width of 6 feet. The motor is a petrol 2-cylinder 'Gardner' with mechanically operated valves and 'Bosch' high tension magneto. The roller works well backward or forward, and may be turned in its own length. Weight when empty 1 ton 10 cwt., and when full 3 tons. It is fitted with powerful band brakes which operate on the hind spindle and are sufficient to control the roller on the steepest road. The whole machine is well sprung, and all the parts are numbered and easily accessible. The consumption of the motor is half a gallon of petrol an hour.

14. Slug Trap, V. T. H. Patent, from Mr. V. T. Hill, Mendip

Nurseries, Langford, Bristol. This is one of the best appliances for the purpose on the market. A small cone-shaped heap of bran is supported on a small trap over salt water which is contained in a small circular metal box, the lid of which has a large central opening. Slugs, cockroaches, and the like are attracted by the bran, and in attempting to reach it fall through the opening in the lid and into the liquid below.

15. Grafting Wax, 'Tenax,' from Messrs. Corry, Bedford Chambers, Covent Garden, W.C. An excellent wax for grafting; not liable to crack in dry weather nor to run in warm; easily manipulated with wet fingers.

Commended.

16. Hoe, Planet Jr. Double Wheel No. 11, from Messrs. Lloyd Lawrence, 29 Worship Street, London, E.C. A first-rate labour-saving implement, fitted with numerous cultivating tools for working the soil between all kinds of garden crops or amongst fruit trees. It can be used by a man or strong lad.

17. Mower, 'Pennsylvania' Lawn, from Messrs. Lloyd Lawrence, 29 Worship Street, London, E.C. A very good machine, which does its work well on long or short grass and is remarkably easy to use.

18. Nesting Boxes, 'The Selborne' from the Selborne Society (Hon. Sec., Mrs. W. Mark Webb), Odstock, Hanwell, W. These boxes are excellent in every way, and many became occupied two days after their erection on trees at Wisley.

19. Plant Protector, 'Handy,' from Mr. F. R. Durham, Fairhaven, Salcombe, Devon. These are useful for protecting rock plants, but would be improved by the provision of stronger supports.

20. Raffia tape, reels and coils of, from Mr. C. E. West, Higham Hill, London, N.E. A strong, durable, and inconspicuous tying material supplied in convenient reels and coils.

21. Spreader, Vesey's Patent, from Messrs. Corry, Bedford Chambers, Covent Garden, W.C. This useful machine distributes lawn sand very evenly and well. All parts are easily detached and adjusted, and the flow of sand can be regulated by turning a screw.

Miscellaneous.

Highly Commended.

22. Garden House from Messrs. Wood, Wood Green. A square garden house with split bamboo cane blinds; very artistic and comfortable.

Commended.

23. Cane Chairs and Settees from the Dryad Works, 42 St. Nicholas Street, Leicester. These are suitable for garden or conservatory use, and were much approved. They are neat, well built, artistic, comfortable, and of good workmanship.

Other Subjects were submitted for Trial by the following firms:

Messrs. Barr, Covent Garden, W.C.; Cooper & Nephews, Berkhamsted; Corry, Covent Garden, W.C.; Drew, Clarke, Leyton; G. Dunford, Ilford; T. R. Ellin, Sheffield; C. Engelmann, Saffron Walden; Hartjen, London; Hughes, Bolckow, Blyth; Jeyes' Sanitary Compounds Co., London; Mrs. Miller, Marlow; Messrs. Newton, Chambers, London; Pearce, London; Purser, Birmingham; H. M. Roberts, Tring; Robinson, West Bromwich; Scott, Woodside; The Acme Chemical Co., Tonbridge; The Acme Patent Ladder Co., Earlsfield; The Alpha Co., Ross; The Boundary Chemical Co., Liverpool; The Folding Span-Light Co., Slough; The Hardy Patent Pick Co., Sheffield; The Three C's Co., Liverpool; Tucker, London; Vipan & Headly, Leicester; Voss, Millwall; Walters, Rugby; C. E. West, London; White, Paddock Wood; Wood, Wood Green.

ESTABLISHED
1804.

INCORPORATED
1809.

TELEGRAMS:
"HORTENSIA
SOWEST LONDON."

TELEPHONE:
VICTORIA 5363.

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

Shows open One Hour later.
1. General.
2. Letters.
3. Telephone and Telegrams.
4. Journals Wanted.
5. Subscriptions.
6. Form of Bequest.
7. Privileges of Chemical Analysis.
8. List of Fellows.
9. New Fellows.
10. An Appeal.
11. R.H.S. Gardeners' Diary.
12. Lindley Library.
13. The Society's Gardens at Wisley.
14. Rock Garden at Wisley.
15. The Wisley Research Station.
16. Students at Wisley.
17. Distribution of Surplus Plants.
18. Exhibitions, Meetings, and Lectures in 1914.
19. Forced Bulb Show.
20. Spring and Summer Shows.
21. Rhododendron Show.
22. Challenge Cup for New Rose.
23. Trials at Wisley.
24. Trial of Seedling Dahlias.
25. Dahlia Prizes.
26. Saxifrage Conference, 1915.
27. Fruit Packing Competitions.
28. Diploma in Horticulture.
29. Examinations, 1914.
30. Information.
31. Inspection of Fellows' Gardens.
32. Affiliation of Local Societies.
33. Affiliated Societies' Certificate Cards.
34. Rules for Judging—1914 Code.
35. Rules for Judging Cottage and Allotment Gardens.
36. R.H.S. Daffodil Year Book.
37. Disbudding of Orchids.
38. Disbudding Chrysanthemums.
39. Advertisements.
40. Shirley Poppies.

SHOWS OPEN ONE HOUR LATER.

A communication having been received from Fellows in the City, asking that the Shows at Vincent Square might remain open one hour longer, the Council, after consulting the most frequent Exhibitors, decided to adopt the suggestion. Fellows will accordingly find the later hours set forth in their Annual Tickets.

1. GENERAL.

Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report

of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on *all* subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number: **VICTORIA 5363.**
"HORTENSIA SOWEST LONDON" is sufficient address for telegrams. This address counts as two words only.

4. JOURNALS WANTED.

The Secretary would be greatly obliged by the return to the Society of any numbers of the JOURNAL which may be of no further use to Fellows. Complete sets are occasionally applied for, but, at the present moment, not even one can be supplied owing to the stock of the following being exhausted :—

Vol. IV. Part 14.
Vol. V. Part 1.
Vol. X.
Vol. XIII. Part 1.
Vol. XIV.
Vol. XV. Parts 2 and 3.
Vol. XXXVIII. Part 3.

These are, therefore, particularly asked for.

5. SUBSCRIPTIONS.

All annual subscriptions are payable in advance on the 1st day of January in each year. A Fellow, if elected before the 1st of July, shall pay the annual subscription for the current year ; if elected after the 1st of July and before the 1st of October, he shall pay half a year's subscription ; if elected after the 1st of October and before the 1st of January, he shall pay at the time of his election the full amount of his subscription for the year commencing from the 1st day of January then next, and no further subscription until the next succeeding 1st of January. To avoid the inconvenience of remembering their subscriptions Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments ; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. It may be a week or more before the Tickets reach the Fellows, owing to the very large number (over 20,000) to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Fellows whose subscriptions remain unpaid are

debarred from all the privileges of the Society ; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas, and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society," and crossed "London County and Westminster Bank, Victoria Branch, S.W."

6. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £....., to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease ; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

7. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 117 in the "Book of Arrangements," 1914.

8. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the address insufficient, they are requested to inform the Secretary at once. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL and the "Book of Arrangements."

9. NEW FELLOWS.

The rapidly increasing number of Fellows is an important indication of the useful work the Society is doing, and of its value to all lovers of the Garden. The President and Council hope that existing Fellows will continue to enlist the sympathy of their friends.

10. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows ; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially by :—

1. Increasing the Number of Fellows.

2. Helping to swell the Fund for providing Prizes for the Students at Wisley.

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

3. Providing Lectures with Lantern Slides.

4. Presenting Books to fill the gaps in the Library both at Vincent Square and at Wisley.

5. Sending new or rare Plants and Seeds for the Garden and surplus Roots for distribution to the Fellows.

6. Sending Plants for the *New Rock Garden* at Wisley.

Thus there is plenty for all to do according to their individual liking : personal effort, money, plants, books, are all alike needed. The Secretary asks for help in the ways above indicated.

11. R.H.S. GARDENERS' DIARY.

The R.H.S. Gardeners' Diary for 1914 contains a considerable quantity of new information, and it has been compiled more especially for the single-handed gardener. The price is 1*s.* 1*d.*, post free, from the R.H.S. Office, Vincent Square, London, S.W. ; or 2*s.* 1*d.* if leather-bound.

12. LINDLEY LIBRARY.

The Society, acting in and through its Council, having now become sole trustee of the Lindley Library, Fellows and friends of the R.H.S. have the encouragement of knowing that their gifts to the Library can never be lost to the Society, but are attached to it in perpetuity. It should now be the aim of all to make the Library far more perfect and complete than it is at present. Gifts of books, old or new, will be gratefully accepted.

13. THE SOCIETY'S GARDENS AT WISLEY.

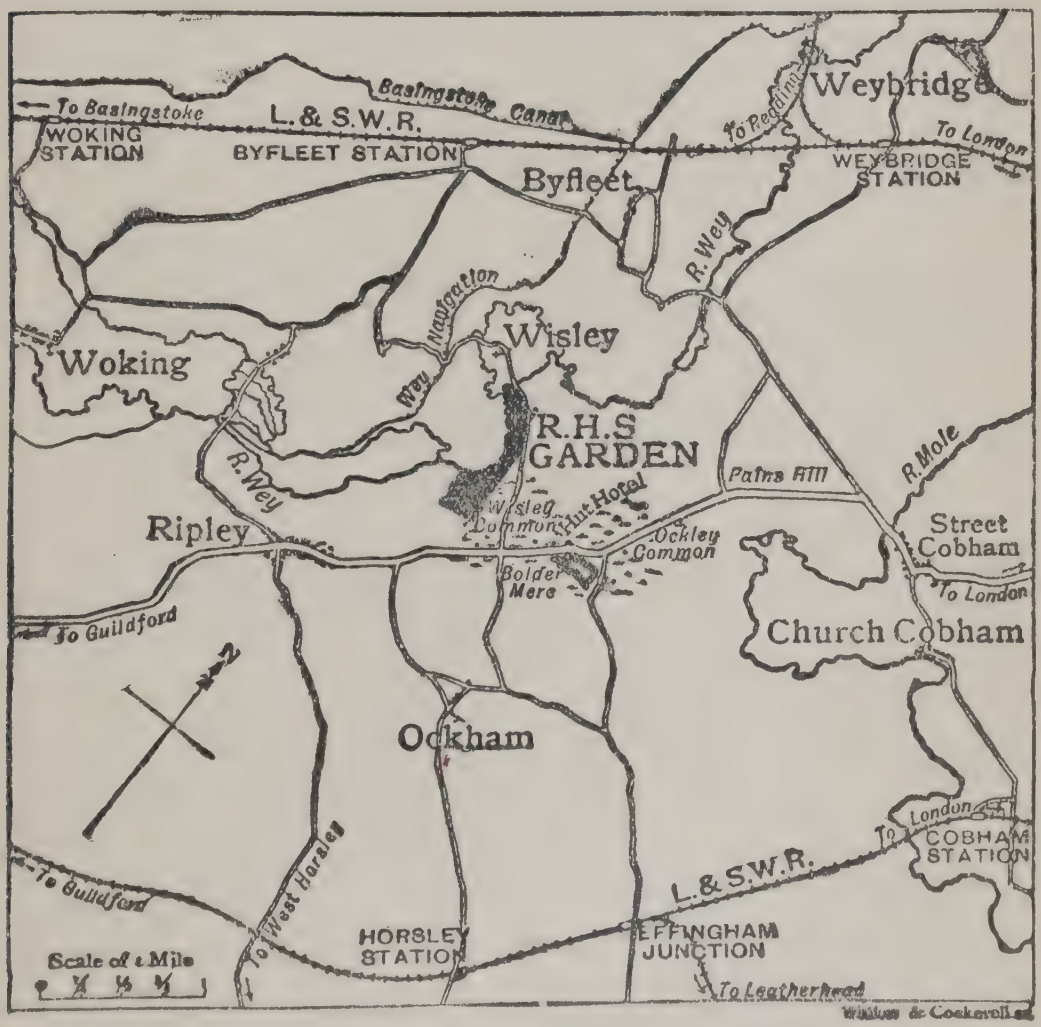
The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets, from 9 A.M. till sunset, except on Sundays, Good Friday, Christmas Day, and Exhibition Days. Each Fellow's Ticket admits three to the Gardens. The Public are not admitted.

The Gardens, situated at Wisley (about 2 miles from Ripley, in Surrey), are about 3 miles from Byfleet, 3½ miles from Horsley, and 5½ miles from Weybridge, all stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey ; the charge being, to and from Weybridge, waiting two hours at the Gardens, 8*s.* ; or waiting three hours, 10*s.* ; or to and from Horsley, 7*s.* ; Effingham Junction, 7*s.* ; Byfleet, 7*s.* Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

The motor route from London to Wisley will be found in the " Book of Arrangements," p. 157.

14. ROCK GARDEN AT WISLEY.

In consequence of the rapidly increasing interest taken in what are popularly called "Alpine Plants," "Alpines," or "Rock Plants," the Council have constructed a Rock Garden at Wisley on a somewhat extensive scale. The idea is to obtain the best possible positions and soils for the different plants to grow in, the growth and well-being of the plants being considered to be of even greater importance than the artistic effect of the rockwork. In a Horticultural Society's Garden every single detail should teach something, so that Fellows visiting it may be able to take away an idea of how best to do this or that, or where best to plant this or that. The construction of the Rock Garden is completed, and the planting is proceeding, but it will be at least two years or more before the plants on it can be seen at their best.



POSITION OF THE SOCIETY'S GARDENS.

An Alpine House has been built above the Rock Garden, chiefly for the purpose of growing rock plants to perfection which blossom too early to withstand our wet winters and late spring frosts. In this House Fellows may see such plants in flower from February onwards.

15. THE WISLEY RESEARCH STATION.

Investigations are now in full swing at the new Research Station and Laboratory at Wisley. All communications relating to them should be addressed to Mr. F. J. Chittenden, F.L.S., Director of the Research Work on Scientific Matters affecting Practical Horticulture, and Lecturer to the Students.

16. STUDENTS AT WISLEY.

N.B.—There will be a few vacancies for the two years' Course commencing in March 1914. Early application should be made to the Secretary.

The Society admits young men, between the ages of sixteen and twenty-two years, to study Gardening at Wisley. The curriculum includes not only practical garden work in all the main branches of Horticulture, but also Lectures, Demonstrations, and Horticultural Science in the Laboratory, whereby a practical knowledge of Garden Chemistry, Biology, &c., may be obtained.

17. DISTRIBUTION OF SURPLUS PLANTS.

A few years ago the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock, which must either be given away or go to the waste-heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded ; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants ? It was, therefore, decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by Ballot.

Fellows are, therefore, particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution is permitted. The great majority also are, of necessity, *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the " Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot ; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is, therefore,

obvious that when the Ballot is kind to any Fellow he will receive the majority of the plants he has selected, but when the Ballot has given him an unfavourable place he may find the stock of almost all the plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Garden cannot be disorganized by the sending out of plants at any later time in the year. All Fellows can participate in the annual distribution *following* their election.

The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form. It is impracticable to send plants by post, owing to the lack of Post Office facilities for despatch without prepayment of postage.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries ; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

No plants will be sent to Fellows whose subscriptions are in arrear, or who do not fill up their forms properly.

18. EXHIBITIONS, MEETINGS, AND LECTURES IN 1914.

The programme will be found in the " Book of Arrangements " for 1914. An Exhibition and Meeting is held practically every fortnight throughout the year, and a short lecture on some subject connected with Horticulture is delivered during the afternoon.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (34) of halfpenny cards *ready addressed* to himself.

January	13, 27.
February	10 (Annual Meeting), 24.
March	10–11 (Forced Bulbs), 24.
April	7, 15–16 (Daffodils), 21, 23 (Spring Roses).
May	5, 19–21 (Chelsea), 25–29 (Rhododendrons).
June	3, 4 (Hardy Plants), 16, 30 (Holland House).
July	1–2 (Holland House), 14, 16 (Sweet Peas), 17 (Carnations), 28.

August 11, 25.
September 8 (Dahlias), 22 (Vegetables), 24 (Autumn Roses), 29–30 (Fruit Show).
October 6, 20.
November 3, 17.
December 1, 2 (Winter-flowering Carnations), 15.

19. SPRING SHOW OF FORCED BULBS.

TUESDAY AND WEDNESDAY, MARCH 10 AND 11, 1914.

A Special Spring Exhibition of Forced Bulbs was held on these days, the object being to demonstrate the varieties best suited for gentle forcing. Exhibits of small and large collections were invited from Amateurs and the Trade. R.H.S. Medals were awarded according to merit. For Schedules and details, see page 48, "Book of Arrangements," 1914.

20. SPRING AND SUMMER SHOWS, 1914.

The Great Spring Show will be held at the Royal Hospital Gardens, Chelsea. A more magnificent display even than that of 1913 can be safely promised for May 19, 20, and 21. The scheme of tenting, and the arrangements generally, will be greatly improved.

The Summer Show will be held at Holland House, Kensington, on June 30, July 1 and 2.

21. RHODODENDRON SHOW, MAY 25-29, 1914.

Messrs. Waterer's show of Hybrid Rhododendrons will be held at Vincent Square from Monday, May 25, to Friday, May 29.

22. THE "CLAY" CHALLENGE CUP FOR A NEW ROSE,

NOT IN COMMERCE, POSSESSING THE TRUE OLD ROSE SCENT.

Messrs. Clay have presented to the Council a Silver-gilt Cup of the value of £75 for annual competition (open to all) at the Holland House Show, its object being to endeavour to obtain a new race of Roses of both good form and colour, but above all else possessing the true old genuine Rose scent, such as may be found in the old Cabbage or Provence Rose, in 'General Jacqueminot,' 'Marie Baumann,' 'Duke of Wellington,' 'General McArthur,' &c. The distinctive scent known as 'Tea Rose' is not, for the purpose of this competition, to be accounted as the true Rose Scent.

Not more than three different varieties may be shown by any one competitor, but at least three and not more than six cut blooms of each variety. The award will not be made in respect of the same rose more than once.

For five consecutive years Messrs. Clay will also present a smaller commemorative Cup, which the Council will give to the winner of the Challenge Cup when at the end of the twelve months it shall have been returned safely and in good condition.

The winner of one year may not win again the next year, but only in alternate years; the Cup will not be bestowed in respect of the same variety more than once.

In any year the award of the Cup may be withheld if the Council are of opinion that there is no exhibit worthy of it.

The decision of the Council is final.

The Council will not award this high distinction unless satisfied and assured that the exhibit is, in the main, due to the work and capability of the exhibitor or his employés: on this point the Council may consult any expert not eligible to win the Cup.

The Council may reserve decision till the third day of the Show.

The attention of intending exhibitors is particularly directed to the Society's 1914 Code of "Rules for Judging."

23. TRIALS AT WISLEY, 1914-15.

N.B.—Everything sent for trial *must be named*, and the name and address of the sender attached, together with the name of the raiser and introducer as far as known.

Fruit.

Melons.—Ten seeds of each variety to be sent in February.

Flowers.

Tulips—of all descriptions.—Five bulbs of each (named) to be sent in August. (See below.)

Herbaceous Phlox.—Three plants of each to be sent in February.

Early-flowering outdoor Chrysanthemums.—Three plants of each to be sent in March.

Pentstemons.—Three plants of each to be sent in March.

Perennial Sunflowers (including Heleniums and Rudbeckias).—Three plants of each to be sent in February.

Asters—French, German, or China.—Seed to be sent in February.

Vegetables.

Broccoli.—One packet of seed of each to be sent in February.

French Beans, outdoor.—One pint of seed of each to be sent in March.

Trial of Tulips.

In view of the confusion existing in the nomenclature of Tulips, the Council of the R.H.S. have been requested to draw up a list of synonyms, and have consented to do so with the co-operation of Dutch growers. Growers, both at home and abroad, have accordingly been invited to send five bulbs of each of their varieties, with the names under which they know them, to Wisley. A response of over

4000 parcels has provided a large and representative collection.' When they are in bloom a Joint Committee of Dutch and English Tulip specialists will be invited to meet at Wisley to determine the correct nomenclature. A synonymic list will then be prepared and issued in the JOURNAL of the Society. It is important that all bulbs sent should bear the name under which they are known to, or sent out by, the sender, and also an indication of their type—as Early, Late, Darwin, Parrot, Bizarre, Bybloemen, Rose, &c. The trial will be continued in 1914–15, and growers are asked to send in August next bulbs of those varieties not sent last autumn owing to the lateness of the date when arrangements for the trial were made and advertised.

If sent by post: The Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey.

If by rail: The Superintendent, R.H.S. Gardens, Wisley, Horsley Station, L. & S.W.R., with advice by post to the Superintendent.

TRIAL OF HORTICULTURAL SUNDRIES.

The Council will continue their Trial of Sundries in 1914, and Sundriesmen are again invited to send their specialities (not more than three articles in any one year). Full particulars, with Entry Form, can be obtained from the Secretary, R.H.S., Vincent Square, S.W., upon receipt of a stamped addressed envelope.

24. SEEDLING DAHLIAS.

The Society's trial of Dahlias, from a garden decorative point of view, carried out in the gardens of Reginald Cory, Esq., at Duffryn, has proved a genuine success, and in consideration of this, and desiring to encourage raisers still further to devote particular attention to producing varieties well adapted to garden decoration, Mr. Cory felt the desirability of holding a further trial next year, and, after putting his views before the Council of the Society and the National Dahlia Society, and being assured of their willingness to co-operate as they did last year, it has been decided to hold a trial in 1914 of seedlings not in commerce and any varieties offered for the first time in 1914.

These will be grown, judged, and reported on in exactly the same way, and as far as possible by the same individuals, as in 1913. Three plants of each variety should be sent, carriage paid, c/o Reginald Cory, Esq., Duffryn, Cardiff, if sent by post; or labelled per G.W.R. to Ely station, near Cardiff, if sent by rail. For various considerations it has been decided that only rooted cuttings must be sent, and those who intend participating in the trials are particularly requested to send them as early as possible in order that they may be grown on to the best advantage before planting out. Mr. Cory kindly offers the Council a £5 5s. Cup to be awarded to the most meritorious plant, and the Council will give any other awards they think fit.

25. DAHLIA PRIZES AT THE R.H.S. MEETING ON SEPTEMBER 8, 1914.

The object of this competition is not so much to attract the finest cut blooms as seen on the Show stand, for such flowers may, when growing on the plant, be almost invisible, and no contribution to the decoration of the Garden, whatever they may be for cutting. The object is to discover the most Decorative Garden Dahlias—that is, those varieties which add most to the beauty of the Garden, for, as is well known, not a few of the most glorious Dahlia flowers add nothing to the aspect of the Garden as they are hidden beneath the foliage. They may be excellent to grow in the Kitchen Garden to cut for house decoration, but they are useless for the ornamentation of the Pleasure Garden. (See paragraph 24.) So-called Show Dahlias *may* also be Decorative and therefore eligible.

Schedule.

Only flowers of those varieties which received commendation in the 1912 trials at Duffryn should be shown unless they be new varieties not yet in commerce. Any others, no matter how attractive as cut flowers, will cause the exhibitor to lose points. A list of commended varieties can be obtained from the R.H.S. Offices.

Class A.—Amateurs.—A group of Decorative Garden Dahlias of all or any sections. Twelve feet run of 3 feet tabling, not to be built up more than 8 feet in height from the ground level.

First Prize : R.H.S. Silver Cup.

The Council may make other awards according to merit.

Class B.—Open.—A group of Decorative Garden Dahlias of all or any sections. Twenty-five feet run of 3 feet tabling, not to be built up more than 8 feet in height from the ground level.

First Prize : Seventy-five Guinea Challenge Cup, presented to the R.H.S. by Reginald Cory, Esq.

The Council will make other awards according to merit.

In both Classes all the stems must touch the water, and no wiring or artificial support will be allowed. Hardy foliage or grasses may be employed for decoration.

The winner will hold the Cory Cup for one year, subject to a sufficient insurance against loss, and to a guarantee to return it in good condition, or, failing this, to refund to the R.H.S. the sum of eighty guineas. On the return of the Cup the Council will present the holder with a smaller commemorative Silver Cup.

The same exhibitor may win the Cup only once in three years, but should the winner of the previous year be again considered first the Council will bestow a special award.

The decision of the Council is final, and the Cup may be altogether withheld at their discretion.

The Council will not award this high distinction unless satisfied and

assured that the exhibit is, in the main, due to the work and capability of the exhibitor or his employés, and on this point the Council may consult any expert not competing for the Cup.

The attention of intending exhibitors is particularly directed to the Society's 1914 Code of "Rules for Judging."

26. SAXIFRAGE CONFERENCE, 1915.

It has been decided to hold a Conference on Saxifrages in the early summer of 1915. The Secretary would be glad to hear from any who would like to contribute a paper or otherwise take a part n the Conference. The exact date will be published in due course.

27. FRUIT PACKING COMPETITIONS.

The following Class appears in the Schedules for June 16, July 14, and the Fruit Show on September 29 :—

Soft Fruit packed in an attractive manner and so as to travel unbruised either by rail or post. The package must be sent by parcel post from the Exhibitor's nearest Post Office, or be handed in at his nearest or most generally used Railway Station, and delivered (by the officials of the Railway or Post Office) at Vincent Square, either on the day previous to, or before 10.30 A.M. on the morning of, the Show. In no circumstances may a competitor bring the package or send it by hand, or otherwise convey it farther than his nearest or most usual Post Office or Railway Station. If sent by rail, a post-card addressed to the Secretary, R.H.S. Office, Vincent Square, Westminster, must be sent at once, saying from what station, and at what time, the parcel was despatched. Separate packages, or punnets, may be used inside the parcel if desired, but the whole package must not exceed 18 inches in length, 10 inches in breadth, and 5 inches in depth—all inside measurements. The packages may be of any material so long as they are sufficiently strong, but not too heavy.

The Council's desire is to obtain a really good and useful lesson in the packing of *soft* fruits so as to enable them to be sent by post or by passenger train, and to arrive in a condition suitable for a gentleman's table. The Council will give special awards to exhibits which are in accordance with the above conditions.

Market growers may compete as well as private gardeners.

"Soft Fruit" includes such as ripe strawberries, cherries, figs, peaches, and nectarines, and not such as apples, pears, and melons, or unripe plums. Tomatos are excluded.

28. A NATIONAL DIPLOMA IN HORTICULTURE.

Most gardeners will welcome the initiation by the Society of a scheme whereby a National Diploma in Horticulture may be gained by those who pass the Preliminary and Final Examinations which will be required. The Diploma will be thoroughly

"National," for by the consent of H.M. Government the Department of Agriculture, after being approached in the matter, has consented to co-operate with the Society if the Society will undertake the work of organizing the Examinations, and has authorized that the Diploma shall bear the following words: "Awarded by the Royal Horticultural Society under a scheme approved by the Board of Agriculture."

The Examinations will be practical, viva voce, and written. The practical part will be held in suitable gardens at convenient centres in the country. The first Diploma Examination will be held in June 1914, and thereafter annually.

Among those for whose benefit the Diploma is established are the following:—Florists, Fruit Growers, Gardeners, Horticultural Inspectors, Horticultural Instructors (not School Teachers giving instruction in other subjects), Landscape Gardeners, Market Gardeners, Nurserymen, Public Park Gardeners, and Seedsmen.

Fuller information may be obtained from the Secretary, Royal Horticultural Society, Vincent Square, S.W.

29. EXAMINATIONS, 1914.

1. The Annual Examination in the Principles and Practice of Horticulture will be held on April 1, 1914. The Examination has two divisions, viz. (*a*) for Candidates of eighteen years of age and over, and (*b*) for Juniors *under* eighteen years. Particulars for 1914 may be obtained by sending a stamped and directed envelope to the Society's offices. Copies of the Questions set from 1893 to 1913 (price 2*s*. post free) may also be obtained from the office. The Society is willing to hold an Examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

The Examination will not be held outside the British Isles until further notice.

In connexion with this Examination a Scholarship of £25 a year for two years is offered by the Worshipful Company of Gardeners, to be awarded after the 1914 Examination to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of 18 and 22 years, and that he should study gardening for one year at least at the Society's Gardens at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is approved by the Council of the Society. In case of two or more eligible students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

2. The Society will also hold an Examination in Cottage Gardening on April 22, 1914. This Examination is intended for, and is confined to, Elementary and Technical School Teachers. It is undertaken in view of the increasing demand in country districts that the School-

master shall be competent to teach the elements of Cottage Gardening, and the absence of any test of such competence. The conduct of this Examination is on similar lines to that of the general Examination. Questions on Elementary Chemistry and Biology are included.

Medals and Certificates are awarded and Class Lists published in connexion with these Examinations.

30. INFORMATION.

Fellows may obtain information and advice from the Society as to the names of flowers and fruits, on points of practice, insect and fungoid attacks, and other questions, by applying to the Secretary, R.H.S., Vincent Square, Westminster, S.W. Where at all practicable it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

31. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost—viz. a fee of £3 3*s*. for one day (or £5 5*s*. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Gardens. Gardens can only be inspected at the *written* request of the *owner*.

32. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of local Horticultural Societies by a scheme of affiliation to the R.H.S. Since this was initiated no fewer than 330 Societies have joined our ranks, and the number is steadily increasing.

Secretaries of Affiliated Societies can obtain on application a specimen of a Card which the Council have prepared for the use of Affiliated Societies for Certificates, Commendations, &c. Price 3*s*. 6*d*. for 10 copies, 5*s*. 6*d*. for 20, 11*s*. 6*d*. for 50, 20*s*. for 100. (See next paragraph.)

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz. Bronze, 5*s*. 6*d*., with case complete; Silver, 12*s*. 6*d*., with case complete; Silver-gilt, 16*s*. 6*d*., with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered, price 6*d*. each.

33. AFFILIATED SOCIETIES' CERTIFICATE CARDS.

At the request of several of the Affiliated Societies, the Council have had the Certificate Card (issued some years ago for the use of Affiliated Societies) beautifully coloured. The uncoloured Card will still continue to be issued at the old prices, and the new coloured Card at 8*d.* a single copy, or 10 for 5*s.*, post free.

34. RULES FOR JUDGING—1914 CODE.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have been revised, and the new edition is now ready. It contains several important amendments, and special attention is drawn to new "Rules for Judging Cottage and Allotment Gardens," with the companion "Judges' Point Sheet," and a "Classification of Stove, Greenhouse, and Hardy Plants for Show Purposes." The Secretaries of Local Societies are advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1*s.* 6*d.*, addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

35. RULES FOR JUDGING COTTAGE AND ALLOTMENT GARDENS.

To assist Allotment holders and Cottage Gardeners in their competitions, a set of Rules, with hints to both Exhibitors and Judges, has been drawn up. These Rules may be had at twopence a copy, or fifty for 7*s.* 6*d.*

A companion Judges' Sheet in a very convenient book-like form can also be had for 2*s.* a dozen. This Judges' Sheet has, in tabulated form, a list of the subjects usually grown in allotment gardens, flower gardens, and for window and wall decoration. The allotments or gardens to be judged are all numbered, and columns are provided in the judging sheet for the points given.

36. R.H.S. DAFFODIL YEAR BOOK.

The Council have consented to publish on August 1 a "Daffodil Year Book." It will contain the most up-to-date information regarding new varieties of Daffodils; the Awards made at the 1914 Daffodil Shows in London, Birmingham, and elsewhere; special articles, illustrative plates, and the Schedule for the 1915 R.H.S. Daffodil Show. The Year Book for 1913 is already sold out, so that all who are interested in these beautiful Spring flowers are advised to order a copy of 1914 at once from the Society's Office, Vincent Square, London, S.W. Price 2*s.* 6*d.* post free.

37. DISBUDDING OF ORCHIDS.

At the request of the Orchid Committee the Council have made a rule that "Awards will not be given to any Orchids of which the natural size and character of the flowers have, in the opinion of the Orchid Committee, been in any way changed or improved through the removal of a bud or buds, or part of the spike."

38. DISBUDDING CHRYSANTHEMUMS.

When single-flowered Chrysanthemum plants are submitted for certificate one plant must be shown without any disbudding whatsoever, and one plant somewhat disbudded, in order that the quality of the blooms on the undisbudded stems may be compared with those on the disbudded stems.

39. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

40. SHIRLEY POPPIES.

For the first time for many years the Rev. W. Wilks is unable to offer Poppy seed. He sowed three times last spring, and three times the army of little black slugs ate all the seedlings up. A dozen or two seeds, at the bottom of a bag, sown under glass in the summer, have alone enabled him to secure seed for his own sowing this year.

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